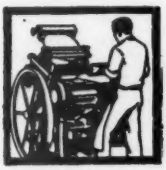
ROCKS and MINERALS

Edited and Published by Peter Zodac

PUBLISHED QUARTERLY



SEPTEMBER 1933

Mineralogy Club Programs for Use in the "Secondary Schools"

— *By* —

BEN HUR WILSON

The question is often asked, why are not more boys and girls interested in really worthwhile things of life? This question might well be answered by another, why are not more capable men and women interested in boys and girls? Why do so many who possess the light of knowledge hide that "light under a bushel?" Perhaps, in part, this may be due to lack of a definite working plan, organized leadership, or of initiative on the part of individuals interested in mineralogy.

Personally, I believe there is a field for Mineralogy Club work among young folks of almost every community, large or small. We are likewise of the opinion, that, in every community of any size there may be found certain individuals who have a lively interest in mineralogy; those who have made the subject their life long concern, and who have gradually accumulated splendid collections, many specimens of which would grace the cabinets of almost any museum. These individuals doubtless have sufficient background both in experience and knowledge to become successful sponsors of Mineralogy Clubs, and would enjoy doing so once the activity was under way.

Some stimulus seems to be needed to bring Mineralogy Club work into being and elevate it to the position enjoyed by other science club activities in our "Secondary School" life. We propose to furnish such a plan as will stimulate and create interest, and cooperate in every possible manner with those who would like to undertake leadership in the development of a National Organization whose object it would be to popularize the study of mineralogy, in the better sense of the word, among the younger people of the nation. We ask your assistance.

This should be an easy thing to do, once the leadership is well established and developed, for all over the land are thousands of keen, alert, likable boys and girls of high school age, and younger, who are eager to learn more and more of the great out-of-doors. These young folks possess an inward longing for correct knowledge of all the natural wonders with which they are daily confronted. Scarcely any pursuit so attracts youngsters, as the gathering of pretty natural objects, be it butterflies, flowers, or rocks. No sooner is the normal child turned loose in his first out-door sandpile, or along a beach, or a brook, than

he begins to gather pretty shells or pebbles, placing them in pans, cans, or bottles, to admire them as among his most valued treasures. Gather a group of children around you and show them a drawer of attractive minerals and enjoy their enthusiasm; get their spontaneous reaction to "this" and "that" in the collection. It will give you a thrill long to be remembered.

What a pity this innate interest in minerals is allowed to wane for lack of proper direction, and their minds allowed to become saturated with the paltry, trivial, and inconsequential things of life, or worse, which have no real sustaining value. Unfortunately, many who are best equipped to lead in this worthy cause have had but little experience in club work or in working with young folks, and, so therefore, feel some hesitancy in beginning work along this line. It is this timidity that I should like to help break down and overcome. I believe with a definite, unified plan to offer, one that is continually unfolding as each new step is taken, we should be able to solve with confidence the problem of "what shall I do next," which is the bugaboo of most people entering such an effort for the first time. Every one in beginning any new venture is apt to be afraid that they cannot see the thing through to the end, or perhaps that it will break down in the middle. Friends, it is just this difficulty that we are striving to overcome.

Owing to the shortness of the time elapsing since publication of the June issue, it has been impossible to get the complete set-up of our National Organization into operation, along the line of the plan outlined in the article, "Should Mineralogy be Taught in the Public Schools," in time to embark upon the full program with the beginning of the current school year in September. We are however making some progress, and are encouraged to believe that it will eventually be worked out to a splendid success. We hope to have the plan in full operation with more than one hundred clubs by September, 1934. This is only an average of about two clubs per state. That should be our goal for the first year's endeavor. It should be easy.

Knowing that there are some who would like to begin organized club work this year, we have decided to publish a skeletonized program, for the year's work, releasing the outline for the first three month's programs in the present issue, and should pronounced interest be shown, we will continue to publish the outlines in the subsequent numbers throughout the year. It is the plan after the movement gets well under way, to furnish complete mimeographed manuals covering each step to be taken in the organization of our club work. Those who are expecting to be pioneers in the work, however, will have to operate largely upon their own initiative and depend more or less upon their own resourcefulness in putting their own ideas across. Perhaps your methods and your problems and the manner in which you solved them may be incorporated into our manual, and thereby be of practical assistance to those who may follow in the work of building up local clubs in the years to come. Many problems will be yours, but none of them need be unsurmountable. We all hope to profit by this experience. Among the most important tasks will be the selection of a group, the choosing of competent officers, arranging a time and place for meeting, securing of cooperation and publicity through the local newspapers, and the drawing and adoption of by-laws to suppliment the constitution, besides many other problems too numerous to mention.

We have prepared a model constitution, a copy of which may be had upon request. This constitution will be adopted by those who expect eventually to come in under the National Organization, thereby becoming eligible for the various honors and awards which will be granted monthly to those doing superior club work. By-laws should be drafted locally to supplement the Constitution, and these should regulate the methods of procedure according to the local needs, situations, and problems. On this account no one set of by-laws could possibly be drawn to serve any number of clubs successfully, which fact makes the matter one of a purely local nature. As soon as ten applications have been received, National Charters will be issued, lettered in the priority in which they are received*. Who will sponsor the original National Club, (there will only be one Original), and who will be the first from each state? In years to come this will be a distinctive honor. Let us has-

ten to get our National Organization under way.

As explained in the original outline (see June issue of ROCKS AND MINERALS), each club operating under the National Charter will hold meetings every two weeks, twenty stated meetings in all during the club work year. Every other meeting beginning with the second is to be devoted to carrying out the National Unified Club Program, and the meetings between to the pursuit of purely local interests. It is the intention that the local meetings shall be more or less informal, while the National meeting is to be of a more formal nature, being conducted on the order of a study hour. It is not enough that our members simply collect minerals; we want them to become familiar with the sound fundamentals of mineralogy as well.

Following we are printing simply a skeleton outline of our suggestions for the first six meetings, covering a period of three months, being the time elapsing before the next issue of ROCKS AND MINERALS. It is our intention to arrange a more elaborate outline, giving helpful suggestions for each part or point of the meeting as soon as the National Organization begins to function fully. These outlines will be mimeographed and distributed free to sponsors of those clubs belonging to the National Organization.

The First Club Meeting
Local Program—Work of Organization

The first meeting should be devoted entirely to the work of organization. A thorough discussion of the aims and objectives of the club work should take place, with an understanding that it is to be entered into with the intention of making it very much worthwhile. A temporary chairman and secretary should be appointed, followed by a reading, and discussion of the National Constitution, and its adoption, if the club decides to go "National" instead of "local". Next in order should be the election of permanent officers as provided by the constitution, and the appointment of standing committees. A special committee will need to be appointed to draft and report on the by-laws, which should be brought up for discussion, revision, and adoption under the order of old business at the next regular meeting of the club. A program committee should be appointed and assignments taken for the first and second Formal Programs to be held at the second and fourth meetings of the club, respectively.

The Second Club Meeting
National Program—Business Meeting and Study Hour

The following program is suggested for use at the second meeting of the club, with the president and newly elected officers presiding. At the formal meetings, it is well that the sponsor keep himself as much in the background as possible, causing the members to feel that it is their duty to assume the responsibility of carrying on the work of the club. The sponsor should take his place on the program the same as any other member, and be on hand to direct a way out of difficulties should any arise.

Program. Part I—Business Meeting

1. Meeting called to order by the President.
2. Roll Call. (Answer by some brief mineral item or note.)
3. Reading and approval of the minutes of the last meeting.
4. Consideration of old business. (Adoption of By-laws.)
5. Consideration of new business. Club project, future programs, and arrangements for first field trip (third meeting), et.

Part II. The Study Hour

1. Remarks by sponsor.
2. Reading of Article of Interest to Mineralogists, "Minerals and Mineralogy". The World Book, Vol. 6,

Foot Note*—Applications for National Club Charters must contain the name and address of the sponsor, the names of at least ten charter members, who have paid the annual National membership fee of 25 cents per member, and the name of the secretary pro tem. Check for the first annual dues must accompany the application, but it will not be cashed until the first full unit of ten clubs shall have been organized. All moneys received by the National organization will be used only to defray in part, the expenses of the National Directors in the publishing of programs, and other aids and suggestions of various kinds, and for postage on material sent to the local club secretaries.

pages 3815-6-7 over to topic, Crystallography, bottom of page 3817. (Reading time 17 min.)

3. Reading of Paper Prepared by Member. Subject, "Mineral Collection and Study as an Ideal Hobby." (Award Paper — National Unified Program Topic). See the suggested outline at close.

4. Demonstration by sponsor or visitor. (May be omitted due to length of meeting.)

5. Taking up questions for Question Box. Distribution of questions to be answered.

Adjournment.

The Third Club Meeting
Local Program—Saturday Field Trip

Nothing so stimulates interest in the early fall as a field trip, away from town, out into God's out-of-doors where one may study and commune with nature. However, there is considerable difference between a well-organized field trip and just a picnic. One may have a field trip and a picnic, too, but the principal objective should not be lost sight of. Field trips are of many kinds, and the kind held depends entirely upon the part of the country one lives in. Clubs may profitably visit a quarry, mine, or gravel pit, some mountain locality, or where none of these are available, there are always places along some stream where special erosional features may be studied and the river gravels are always bound to yield interesting specimens upon proper investigation. Trips to industrial plants should be avoided in the early autumn as these should be reserved for the winter months when it would be less practical to go out into the open country. Every field trip should be supervised by committees on arrangements, who should secure permission to visit, where required; provide transportation, food, etc. Working tools are also necessary, and the party should be well equipped with hammers, picks, chisels, etc., and means of properly packing and transporting the specimens. Last but not least no party should go into the field without provision being made for taking notes. Each member should carry a memorandum book, and the localities where each specimen is obtained should be accurately and definitely marked.

The Fourth Club Meeting
National Program—Business Meeting and Study Hour

Program. Part I—Business Meeting

Part I of the program should be carried out as outlined for the second club meeting, with additional reports by the Treasurer, the Membership and Club Project Committees, and the reading of such correspondence as may have been received by the Corresponding Secretary.

Part II. In General follow the same order of procedure as used in the first study-hour program (Second Meeting).

Program Basis—Mineralogy as a Science

1. Remarks by the sponsor.

2. Reading of Article of Interest to Mineralogists. Topic—"The Earth as a Planet." (A paper intended to convey some notion of the character and properties of the whole earth and show the importance of Mineralogy in the study of the Earth's structure.)

3. Reading of Paper Prepared by Member. Subject—"The Place of Mineral in the Scheme of Things." (Award Paper, National United Program Topic.) A paper discussing the broader classification of the material of the Earth's Crust, defining Rocks, Minerals, Ores, Metals, Clays, etc.

4. Demonstration by Sponsor or Visitor. "The Physical Determination of Minerals." An outline of the various methods employed by mineralogists in making a purely physical determination of the identity of minerals, illustrated by examples of their common properties.
(Note:—The National Director of Program Building and Research will furnish to those sponsors requesting it, through their corresponding secretary, without cost, a list of suitable reference topics for No. 2, Part II. A mimeographed outline for No. 3 prepared along the line of the sample submitted at the close of this article, and an outline for the demonstration and talk to be put on by the sponsor, under 4.)

5. Discussion of points brought out in the Program, and answering Question Box Queries.

Adjournment.

The Fifth Club Meeting

Local Program:—Exchange and Social Hour

This evening should be spent in a purely informal manner. If possible it should be held in a laboratory or other place with ample table room and each member should bring in his collection, or the better portion of it where it could be layed out separately, each piece properly labeled. By the end of eight weeks many choice specimens should be accumulated. Some time should be spent by the members in getting acquainted with the other fellow's collection, and especially in becoming familiar with any new material present.

An informal program might be held which could afford much enjoyment. The following are suggested things to do. If possible this should be sprung as a surprise program.

1. Let each member exhibit and tell about what he considers his best or rarest specimen. Where it came from, how he got it, etc.
2. A mineral prize might be given by the sponsor to the member having specimens from the greatest number of states and foreign countries. Each foreign country counting as much as two states.
3. On the world map find and locate the origin of each foreign specimen, and a prize might be offered for the one coming from the greatest distance. If a piece of a meteorite is present it should take the prize.
4. The sponsor could select representative mineral pieces from the collections present and place them together on a separate table identified only with numbers. Twenty-five or thirty varieties should do. Each member should be given a sheet of paper with numbers, besides which he should write the correct name of the mineral to correspond. The member getting the most correct should be given a mineral prize. In checking the list each number properly named and spelled should count two, and each one named but spelled incorrectly should count one.

Following this should come an opportunity for carrying on exchanges, at the close of which refreshments might be served. The sponsor or a committee might also devise other forms of entertainment.

The Sixth Club Meeting

National Program:—Business Meeting and Study Hour

Program. Part I—Business Meeting

This part of the program should be carried out in the same manner as outlined for the second and fourth meetings. Committees should be appointed to arrange for the seventh meeting which should be a field trip and picnic, probably the last out door trip of the season for those residing in the northern part of the country.

Part II—The Study Hour

Program Basis:—The Economic Use of Minerals.

1. Remarks by the sponsor.
2. Reading of Article of Interest to Mineralogists. Topic, "Man's Early use of Minerals." "The Stone, Iron and Bronze Age." Etc.
3. Reading of Paper Prepared by Member. Subject, "Man's Economic Use of Minerals." (Award Paper. National Unifield Program Topic.)
4. Demonstration by sponsor or visitor. Aim, an understanding of, "The Building Blocks of the Universe." Elements, atoms and molecules, etc.
5. Discussion of points brought out in the Program, and the answering of Question Box Queries.

(Note:—Outlines have been prepared and mimeographed for parts 2, 3, and 4, of Part II of the Program which may be had upon request, through the Club Corresponding Secretaries.

These Program outlines are to be continued in the December Number of ROCKS AND MINERALS should a reasonable demand be shown on the part of those who are interested in the Mineralogy Club Movement.

Ben Hur Wilson, National Director Program Building and Research.
National Unified Mineralogy Club Programs for the "Secondary Schools."
112 Mississippi Avenue, Joliet, Ill.

Note:—The following outline is being printed so that you may start to work immediately upon the preparation of your prize paper, and as a sample of the mimeograph aids we propose to furnish club sponsors.

Second Meeting—First Formal Program
Suggested Outline for the Prepared Paper

Subject—"Mineral Collection and Study as an Ideal Hobby."**

1. What is mineralogy?
2. The definition of a hobby.
3. Growing need of proper use of leisure time; and
4. How mineralogy may supply such needs.
5. Mineral collection takes one out of doors;
6. and thereby stimulates mental and physical health;
7. and, incidentally affords one the opportunity to become interested in other out door activities, and in travel.
8. It increases one's knowledge, and has much of carry over value into other subjects, such as physics, chemistry, geometry, geography and history.
9. A thorough knowledge of mineralogy may lead to gainful occupation, since much of the world's work is associated with the finding, obtaining, and processing of many forms of minerals.
10. It satisfies one's longing to collect, and brings one into contact with and possession of objects of unusual beauty, thus developing his esthetic tastes.
11. Such collection may be carried on with but little cash outlay, as many minerals may be obtained practically without cost, by collecting, exchange, or gifts.
12. Such a collection, once acquired, requires little care, and is durable, lasting for a life time.
13. There is no end of material for study, so that the hobby may be pursued a life time, its interest growing on him all the while.
14. In old age one finds great solace in his collections.

* * *

**The best paper received containing between 2,000 and 3,000 words, following this outline, submitted to the National Director of Publicity and Awards by November 1, 1933, which has been written and read before a National or Local Mineralogy Club by a member, will be published in ROCKS AND MINERALS Magazine and receive a mineral prize valued at $2.50. Write the National Director for instructions. Mr. Edward C. Foster, National Director of Publicity and Awards, No. 1 Kingsley Avenue, Haydenville, Mass.

CORRECTIONS

In the last issue of ROCKS AND MINERALS (June 1933) an error occurred in the poem "Diamond" by E. F. G. The second line, second column, reads "Still when with air oxygen to aid". This should read "Still when with air *or* oxygen to aid." The first word of the last line (in parenthesis was also spelled wrong. "Writeen" should be "written". Please make these corrections in your copies.

NOTICE

Want to hear from all dealers and others who have shipped minerals to John Obert, Ridgewood, N. J., for which he refuses to pay and even to acknowledge the receipt thereof.

BOODLE LANE
B 331 Galena, Kansas

A Visit to the Lithia and Plainfield, Mass., Localities

—*By*—

BETTY VELEYN BROWNE,

33 *Emerson Avenue, Pittsfield, Mass.*

It is not infrequently that collectors who have heard much favorable comment about certain localities are far from satisfied with the results of their quest when they at last manage to visit such places. However, those who have an opportunity to go to the Lithia locality and abandoned Plainfield rhodonite workings are sure to be spared any such disappointment, for in both fields there are to be found abundantly specimens which, although not in most cases of particularly fine quality, nevertheless make welcome additions to practically any collection, chiefly because of the fact that they represent such a wide range of species. Since these spots are separted by but a comparatively short distance, it is advantageous to explore both of them on the same trip. If Pittsfield is the starting point, one follows the beautiful Berkshire Trail through Windsor and Cummington to Lithia, on a ride that alone is exceedingly refreshing, for it takes one along a splendid highway winding through the picturesque mazes of the gently rolling Berkshire Hills, which are endowed by Nature with an irresistible charm all of their own.

The group taking part in this particular outing consisted of: Mr. and Mrs. C. H. Klein, of Hudson, N. Y.; G. Alvan Barrus, of Lithia, Mass. (who, with Mr. Klein, arranged the trip); Edward C. Foster, of Haydenville, Mass.; Ramon Conover, of Kyserike, N. Y.; Fred W. Schmeltz and mother, Mrs. Mary Schmeltz, of New York City; and Peter Zodac, of Peekskill, N. Y.;—also Mr. Barrus, Sr., Johnny, and Ruth Barrus, of Lithia; and the writer. The outing was held May 6, 1933.

After being most hospitably welcomed by Mr. Barrus, on whose farm the albitic granite is found in scattered boulders originally from the pegmatite dike of which one contact is mica schist, we set out over the rock-strewn ground for the near-by tiny stream along the banks of which we did most of our collecting. The gray sky, having till then remained undecided as to whether or not to open up its leaden rain-coffers, at last began to send down a fine drizzle that in no way seemed to dampen the ardor of the party. After all, what did a little shower matter when there were lying about rocks studded with tourmalines, muscovites, and numerous other minerals, to stimullate the enthusiasm of the collector?

The woods soon rang with the resounding echo of hammers, as various members of the group industriously applied themselves to the enjoyable task of exploring beneath the surfaces of the more interesting boulders. In spite of the gloomy weather, the scene was a delightful one, with the brooklet rippling gaily over its rocky bed, while the trees looked down in silent dignity upon the ground with its russet carpet of leaves, through which a few spring wild flowers shyly peeked, weaving dainty patterns of purple and gold upon the more somber background of the forest floor. The mineralogists, however, were too busily occupied to pay much heed to the handiwork of the plant kingdom, nor is it any wonder that they had neither eyes nor thoughts for anything but the rocks before them, for these presented an interesting variety of minerals.

Some, with the albite, quartz, and spodumene richly inlaid with a profusion of tourmaline crystals—green, black, blue (indicolite), and bi-colored—were strikingly attractive, presenting natural mosaics of unusual beauty. Then, too, there were glistening muscovites—silvery white, green, and (more rarely) a delicate rost tint—to heighten the general effect; to be sure, it was difficult to secure very good individual specimens, for although the material looked lovely in the aggregate, the quality was generally but fair. Matrices of cleavable spodumene

(grayish and greenish), snowy albite, and quartz yielded pretty specimens of crystallized muscovite penetrated by blue and green tourmaline, while the efforts of a few were rewarded with the finding of good samples of white beryl (goshenite), as well as inferior green beryl, of which there was a little. Furthermore, pearly cymatolite, small but well-formed almandite (?) garnets, biotite in small flakes, quartzes (greasy, white, smoky, and limonite-stained), pyrite films on cleavelandite (albite), orthoclase, and thin plates of ilmenite were present to add to the number of species already represented. Other minerals native to that locality, but which we failed to find, are cassiterite, columbite, and zoisite.

It was indeed delightfully refreshing to get away from the dull monotony of life's daily routine to the very heart of the great out-of-doors where, in a setting of sylvan loveliness, treasures from Nature's incomparable laboratory presented themselves for the taking. At last, however, we were obliged to tear ourselves away from our enticing surroundings, for if we were to visit the rhodonite locality, we had to start. But before proceeding to an account of the next phase of our outing, it might be well to quote a little of what B. K. Emerson says in regard to this property in the U. S. Geological Survey Bulletin 597, "The Geology of Massachusetts and Rhode Island," on page 257:—

"At the Barrus farm the mass of the dike seems to be represented in place by a coarse aggregation of white quartz, orthoclase, and muscovite, and a little greenish beryl, accompanied in places by a contiguous vein of reddish-white quartz. The scattered boulders of albitic granite appear to be fragments of a central band or secondary vein whose slow crystallization is suggested by the beautiful aggregate of snow-white cleavelandite and grayish-white quartz, which forms the matrix of the rarer minerals . . . "

After a bite of lunch, we set out for our next destination, Plainfield, the location of a manganese occurrence where mining was once carried on in the open pits which have long been abandoned, principally due to the fact that difficulties were encountered in the lack of satisfactory facilities for transporting the ore, as well as in its chemical complexity. The best specimens of the pretty silicate of manganese, which is in some cases of a very rich and beautiful color, can be obtained by breaking up some of the oxidized material strewn about in piles over the rugged fields. To the eye, this consists merely of a black mineral (chiefly pyrolusite), but by splitting off this dark coating, one finds that he has exposed a rich rose tint that contrasts charmingly with the ebon-hued oxide, affording specimens of unusual loveliness. In the pits (there are five) cubically crystallized pyrite is to be found embedded in the rhodonite and small veins of milky quartz from which, due to the hardness of the matrix, it is only with difficulty that good specimens can be obtained, although interesting pieces showing pyrite casts may be picked up readily. Here and there brilliant orange ferruginous quartz betrays the presence of limonite, which is to be seen as yellow ocher. Scattered lavishly through the clinochlore, of which there is an abundance, tiny, sparkling, well-crystallized garnets (manganese?), varying in size from mere specks to stones over one-fourth inch in diameter, catch the light on their clear-cut faces, while where the weather has already been active in its work of disintegration, the pulverized rock can be scooped out, and the shining red crystals, after being separated from this debris by washing, make excellent specimens for vials. This locality, which, incidentally, commands a lovely view of the surrounding hills, yields, in addition to the minerals already mentioned, good bladed crystals of that variety of amphibole known as fasciculite distributed profusely through the clinochlore, fair grayish coatings of aragonite on chlorite schist, brown pseudomorphous limonite, poor rhodochrosite (differentiated from the rhodonite by its paler color and granular structure), and greasy, milky, rose, and smoky quartz.

Even good things must eventually come to an end, so at last we realized reluctantly that we had to leave this fascinating spot, but we did so with the firm conviction that we would all remember for a long time to come the happy hours we had spent in the mutual enjoyment of an outing as rich in its yield of specimens as it was pleasurable, for there is, in my estimation, no keener, more genuine joy than that experienced in taking part in a fruitful search for minerals in company with a congenial group of enthusiasts.

Science and Its Literature

—*By*—

EUGENE W. BLANK

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L'ordre est presque toute la science.
Remy de Gourmont.

True knowledge is comprehended only through the senses. The essentiality is to observe and that correctly. Lucretius warns, "If we cannot trust the senses, how is it possible to distinguish what is true from what is false?" Irrefutable observations are facts and constitute science. Every science has been observational in its early development primarily because observation implies no knowledge of the phenomenon. Observation is the first instinctive act of an inquiring mind. As Remy de Gourmont has remarked the sciences and arts date from the leisure of the first winter our ancestors passed by their fires. On the basis of observation can be explained the late rise of some branches of science; they did not exist until an initial observation was made by an experimenter. In this connection one recalls spirit photography.

Every science, if its progress is unhindered, passes through the successive stages of observation, experiment, classification, theory and hypothesis, law and generalization. The generalization represents the highest development of a science; it is the unifying thread which binds apparently unrelated phenomena into a concrete, compact whole. The scientific generalization is a law of laws.

The experiment is a question put to Nature! It implies looking forward to a result and assumes some knowledge of the subject. Experiments never deceive; the implications are sincere, but the human mind can not consistently discriminate.

The third stage is that of classification and tabulation. Experiments have been made and results obtained. So that the progress of science may be rapid and undelayed it is essential that results be communicated to fellow experimenters so that all subsequent research may be made on the basis of recorded knowledge. Thus we have a great body of printed matter, the so-called scientific literature, repository of all factual experience (1).

This literature is vital to the promulgation of laws and their subsequent welding into generalizations. Since the latter bind many facts into one simple description their proper appreciation and use eliminates whole libraries of books and journals. But to secure generalizations a vast and comprehensive chemical literature is an absolute prerequisite. One dare not decry the enormous output of printed material though it threatens to engulf one. One must make the best of the matter and try to avoid being engulfed. One does not rise to sublime heights thinking of the cost of paper! On the other hand one must never accept this organized literature as being science itself, rather the process of accumulating knowledge is science. Science is creative at all times and asks less for words than work; long continued, patient study of the workings of nature.

In making a literature search few papers of more than twenty years age are of any great value in their detail. One or two pithy sentences will contain all their essentials. One can safely assume that all prior knowledge of any value will have found its way into books. Not all knowledge is essential to science (2). The only valid objection to the great bulk of scientific literature is the waste of time and paper with its accompanying expense. At the present day there are approximately 30,000 publications. Most of the material, it must be admitted, is unsatisfactory in approach and presentation. But since it is a necessary evil and since it will solve its own problem by soon returning to dust one need not unnecessarily fear it. A chemical search of the literature of the present day presents no difficulties; one of the future need present no greater trouble (3).

All this is tantamount to declaring that every science tends toward simplicity

as it becomes older. The day will come when science will command attention and attract adherents solely by simplicity.

A few sciences are becoming complete. Mineralogy, for example; its basic outlines are already discernible, only the details remain to be marshalled into the framework. And modern anatomy is already complete.

Certain aspects of science, as reflected in the present day literature, are quite new and novel. Since science is an approximation to various ideal states as conceived at successive periods of intellectual growth it is not surprising that the inquiries put to nature are being done in a more and more subtle fashion. The X-ray, Ramen spectra and quantum mechanics are new to man and print. The day of the lone experimenter is gradually drawing to a close. Organization is the dominant characteristic of modern life, no less in science than in business, All activiation is more and more a matter of coordinated regulation. Through organization the discovery of scientific facts and their utilization in the industrial world is viewed as an assured finality before being accomplished. Research has become methodical and purposeful.

The advantages of a thorough literature search before commencing work on a projected research problem have always commended themselves to the discriminating worker (4). The ends and means of science are in no way helped by a lack of literature and any criticisms or attacks on the scientific literature are unfair if they do not differentiate between the amount of knowledge and the efficiency with which it is imparted to the reader. There can not be too much of a good literature, well written, ably and clearly presented.

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Noyes, "Chemical Publications," J. Am. Chem. Soc., 42, 2099 (1920).

(4) Hamor and Bass, "Bibliochresis: The Pilot of Research", Science, LXXI, 375 (1930).

Geologic Structure of the Devonian Strata of South-Central New York:—By Arthur Albert Wedel, Ph. D., Cornell University, 74 pages, 1 map. The purpose of this paper is to consider in some detail the facts as to the geologic structure of south-central New York, and, in addition, to suggest their probable relation and origin. The present study is of special importance due to great development of interest in prospecting for gas in the region so that every available source of information is in demand. Issued by New York State Museum, Albany, N. Y. as Bulletin 294.

Forty-First Annual Report of the Ontario Department of Mines (Toronto, Canada).

Three bulletins have recently been released as follows:—

Vol. XLI, Part 1, 1932 (150 pps. 2 plates).

Statistical Review of Ontario's Mineral Industry in 1931 1-50
List of Mines, Metallurgical Works and Quarries 51-62
Mines of Ontario in 1931 ... 63-114
Mining Accidents in 1931 115-128
Classes for Prospectors, 1931-32 129-131

Vol. XLI, Part III, 1932 (59 pps., 18 illus., 2 sketch maps, 1 plan, 2 colored geological maps).

Geology of the Three Duck Lakes Area, By H. C. Laird 1-34
Geology of the Swayze Area, By Geo. D. Furse 35-53

Vol. XLI, Part IV, 1932 (54 pps., 20 illus., 14 sketch plans and diagrams. 2 colored geological maps).

Geology of the Townships of Janes, McNish, Pardo and Dana, by E. L. Bruce 1-28
Moose Mountain—Wanapitei Area, by L. F. Kindle 29-49

Rocks and Minerals Association First National Outing

An event unparalleled in the history of the country, if not in the world, was staged on the 9th of July, 1933, in seventeen states. For on that date a large number of persons, representing practically every state in the Union, attended seventeen separate field trips to mineral localities.

By auto, by train, and afoot, the collections came. Young and old, rich and poor, boy and girl, from the largest city down to the smallest hamlet—all were represented. Equipped with hammers, chisels, collecting bags and other accessories dear to a collector's heart, they searched for mineral and fossil specimens, inspected mine and quarry workings, and studied interesting rock structures and geological formations. They dug into heaps of waste rocks unearthing metallic ores; they scaled the steep walls of quarries in the quest of gem material; they crawled through narrow openings in mines gathering crystals that lined the interior walls; and even waded streams to pan for gold. Never before had so much collecting been done in a single day—from rough rock specimens down to delicate fossils; from large masses of iron ore down to minute gemmy crystals.

For many, a collecting trip was a new experience and what pleasure it was to see the enthusiasm of these beginners. Their energetic hammering away at the rocks and their overflowing sacks of specimens were ample proof of the thorough enjoyment and interest in their new hobby. Yet the same enthusiasm was shared by many a veteran collector for it seems that every locality has a new interest with each additional visit. Then, too, a locality is a rendezvous for old friends and the place where new ones are made.

Many newspapers and magazines heralded the coming of the nation-wide event and later published reports on individual outings. The grateful thanks of the Rocks and Minerals Association and the directors are extended them.

Reports on the individual outings are as follows:—

ALABAMA

Dr. R. S. Poor, Director

This outing was held the day previous, Saturday the 8th, as a number of those interested in attending objected to its being held on Sunday. There were two trips, one in the morning and one in the afternoon. A total of 50 people attended, a very gratifying number, and all voted the affair a most interesting and very successful one.

ARKANSAS

No outing held.

CALIFORNIA (The Bay Region)

John Melhase, Director

A party of 16, under Mr. Melhase, met at 7:00 A. M. at the Grand Lake Theater in Oakland and proceeded to the Mother Lode district of Calaveras and Tuolumne Counties, going via Tracy, Oakdale, and Jamestown, to Angels Camp, Melones, Carson Hill, and San Andreas; returning via Valley Springs and Stockton. The trip was approximately 300 miles long and covered about 30 miles of the most interesting and historical section of the Mother Lode belt.

A picnic luncheon was enjoyed beneath a huge oak tree in the door-yard of Mark Twain's old cabin on Jackass Hill, a locality famous for the gold pockets that have been found there. After luncheon, the pocket diggings were inspected and the party interviewed Mr. H. Neumeyer of **Saturday Evening Post** fame, who described his finding of the latest pocket. One large leaf of gold from this pocket was worth $1,350. Here the party collected quartz, calcite, slate, and pyrite.

The next stop was at Carson Hill. Here a huge glory hole of the Carson Hill mines afforded some excellent mariposite, ankerite, quartz crystals, and fine

pyrite crystals, loose and in ankerite schist. From here the party proceeded to Valley Springs where various forms of chalcedony and moss agate were collected. By that time the dav was waning and the party decided to start for home. All were agreed that it was a most enjoyable and profitable trip and look forward to the next Outing of the Rocks and Minerals Association.

CALIFORNIA (Southern California)

Herman Abraham, Director

A party of 76 very enthusiastic collectors, many of whom were members of the Mineralogical Society of Southern California, attended the outing at Palos Verdes Estates where from the cliffs above the ocean a large number of fine groups of barite crystals were collected. A special feature of the outing was an interesting and very instructive lecture on the geology of the region by Mr. E. V. Van Amringe, Professor of Geology at Pasadena Junior College. The outing was so enjoyed by those present that all expressed the hope more of them would be held in the future.

CALIFORNIA (Needles Division)

J. C. McCorkle, Director

This outing, held on April 9th, was attended by an enthusiastic group of 12 persons, residents of both California and Nevada; a fine turn out considering the small population in this section of the country.

The group met at the Fred Harvey Hotel according to plan, leaving about 8:30 A. M. The trip took them on the Gold Bend Road to the Gold Dollar Mine, and then north toward Eagle Mountain. Several stops were made on the way to collect mineral specimens, among them were: agate, opal, about 18 different colors of jasper, and ores of lead, silver, and copper with small amounts of gold present in them. A complex ore, containing ores of all four of these metals aroused much interest and discussion.

About 6 miles north of the Gold Dollar Mine, two shots were placed in an ore ledge by the director, and specimens were blasted out for the group.

Aside from the main feature of collecting minerals, this trip also provided some wonderful scenery. After lunch was served the party returned home through Eagle Pass, a narrow canyon with the walls of Eagle Mountain towering a thousand feet overhead. The deepening shadows of the late afternoon threw an ever-changing play of color on the canyon walls, reminding one of the Grand Canyon in miniature; and the broad valleys covered with cactus and desert wild flowers gave a touch of color and charm to the passing landscape. Altogether, the desert was at its best, a scene of grandeur not soon to be forgotten.

COLORADO

Wayne W. Ward, Director

Twenty-two enthusiastic mineral collectors comprised the group attending the outing here under the direction of Wayne W. Ward.

Favored with perfect weather, all plans for the day were carried out with great success. From their meeting place at the Colorado Springs Public Library the group motored to the property of Mrs. E. L. Kernochan located in upper South Cheyenne Canyon. Not only is this region rich in minerals but it is also one of great scenic beauty. Ordinarily it is not open to the public, but through the kindness of Mrs. Kernochan it was made available for this field trip.

A large number of rock and mineral specimens were found, a much greater variety than had been anticipated. A number of good specimens were also obtained from the famous zircon locality of St. Peter's Dome which was within walking distance.

IDAHO

Julian M. Field, Director

Fossils were the objective of the outing held in Idaho this year. For want of a suitable location nearby in which to seek mineral specimens, a party left Payette on the morning of July 9 for what is known as the Willow Creek country, some 20 miles east of the city. This particular region presents a series of hills composed mostly of shale or soapstone with crystals of gypsum sprinkled here and there, and only in the early days of spring can vegetation be found on many of these rounded hills. During mid-summer this section presents a forbidding appearance, but the fossils found therein

makes one feel the trip well worthwhile despite the discomfort of a blazing sun on the desert wastes. These fossils tell the story of a land once covered with dense forests, of a vast lake where tulles and other acquatic plants grew in abundance, all of which can be read in layer after layer of fossil remains which, through the years have accumulated to a depth of several feet. The fossils which were uncovered pointed to the fact that many species of plants and trees now foreign to this region, except in the irrigated sections once grew there—pines, willows, sycamores and many others which remain to be identified. These fossils are found in earthy deposits and in sandstone. First one encounters a deposit which as to color has the appearance of lignite coal, next comes a layer of shale, bearing mostly imprints of pine needles, and at a greater depth, sandstone is encountered.

While the Idaho party consisted of but nine persons, those who made the trip feel they were well repaid for their efforts and look forward to another trip to the same locality—perhaps in the fall, when it is hoped excavation may be carried on to a greater depth, as what lies beneath what has already been uncovered arouses curiosity and calls for further investigation.

ILLINOIS

Ben H. Wilson, Director

Two types of activities, calling for two distinct lines of investigation were on the program of the outing held in this division. In the forenoon attention was given to the practical uses to which rocks and minerals are put; and in the afternoon a field trip was made in order to permit members of the party to observe the occurrence of coal and other minerals, and to gather fossils in situ.

With these objectives in view a group of 47 left the Joliet Township High School Building for the stone cutting plant of Adam Groth & Co., at 1315 Cass Street. The party was met at the plant by Mr. Gordon Longley, son of the president of the company, a graduate of the University of Illinois, who very courteously and efficiently showed us all of the various processes and steps necessary to prepare stone for the various building purposes. This plant is among the largest in the country and a number of stones are worked with, including limestone, dolomite, travertine, marble serpentine, granite, and occasionally other stones.

In passing through the plant, our first sight was the huge blocks of stone just as they come from the quarry; some so large that two or three would fill a flat car. Next, we saw these stones being cut by immense swinging gang saws, then further treated by planing and polishing. The party was invited to take generous samples from the large assortment of waste rock, some of it cut and polished.

The party then proceeded to the mineral grinding plant of the F. E. Schundler & Co., at 800 Railroad Street, also one of the largest of its kind. Mr. P. S. Denning, Chief Chemist and Research Director took charge of the party and explained all of the processes in an interesting manner. Among the minerals treated are talc, which is ground to a powder for use in the paper industry; vermiculite, which is expanded by heat; and magnesite which is calcinated.

After leaving this plant, about half an hour was spent at the great Brandon Road locks on the new waterway. This feature was thoroughly enjoyed by all, for the huge lock chamber containing 600,000,000 gallons of water was emptied while we were there.

In the afternoon, the party again met at the high school building, then drove to the Wilmington Strip Mines (coal) which are the largest in the world. A short stop was made on the way at the Kankakee River bridge to gather invertebrate fossils.

At the mines, hundreds of acres of surface material have been removed so that we were able to actually walk on top of the vein of coal and observe it as it had layed for millions of years undisturbed by either man or nature. It is in the huge piles of waste material that literally millions of the finest fossil plant specimens can be found, and which in the early days made Mazon Creek so famous. Many fine specimens were collected here and at the bottom of the pit, and when everyone had gathered to his heart's content the party departed, each going their several ways—the end of a perfect day.

The meeting was especially honored by the presence of Dr. A. C. Noe, Paleontologist of the University of Chicago and

author of many books on geology; by Dr. John R. Ball, Professor of Geology of Northwestern University; and by Dr. Donald Carrol, of the State Geological Survey, of Urbana, Ill.

MAINE

Leonard H. Starbird, Director

Report will appear in December number.

MARYLAND

Dr. Mark H. Secrist, Director

From Johns Hopkins University in Baltimore, the meeting place, a group of six mineral collectors drove to a number of interesting mineral localities.

The Bare Hills section north of the city was the first stop. The rock formation here is mostly serpentine, which in weathering leaves a very poor soil, so there is but scant vegetation; hence the name, "Bare Hills". This section is historically famous because it marks the place where the chromium industry started in the United States. Chromite, the ore of chromium, is associated with the serpentines and many interesting specimens of the ore, as well as other minerals, were collected.

In continuing their travels, the group encountered pegmatite dikes and a hornblende-mica schist; and from these rocks a number of nice specimens were also obtained.

Two abandoned mines were visited, one a copper mine at Mt. Washington and the other a copper-iron mine at Mineral Hill. Both yielded good specimens.

Though the group was small, they more than made up in enthusiasm what they lacked in numbers, and altogether they felt well repaid for their travels.

MONTANA

A. J. Harstad, Director

No report submitted.

NEBRASKA

V. K. Overman, Director

Thirty-four were present at the outing in this division, a most remarkable showing for a section of the country which is rather poor in mineral localities. When this fact is considered, and also that a parking charge was levied against each car, then indeed this outing was a grand success.

All of those present were from Omaha with the exception of Mr. and Mrs. Thomas A. Cherry and their daughter Margaret, who came from Logan, Iowa. Little Miss Margaret, nine years old, had the distinction of being the youngest collector in the group. Everyone was very enthusiastic about the field trip and all expressed a desire for more frequent trips of this nature.

The Rocks and Minerals Association and Mr. V. K. Overman, the director, wish to thank the Omaha Nature Study Club for their cooperation in helping to make the occasion such a successful one. This organization was well represented.

A large selection of rock specimens were collected including limestones, sandstones, quartzite and shale. Mineral specimens included iron pyrite, nodules of flint and iron-clay concretions. A large variety of fossils of the Carboniferous age were collected among which were corals, crinoids, brachiopods and mollusks.

NEW YORK-NEW JERSEY

Fred W. Schmeltz, Director

It was in this division that the Association's first annual outing was held, the success of which led to the inauguration of the National Outing. Last year, on June 26, when this single outing held at the Forest of Dean Iron Mine in Fort Montgomery, N. Y., served for the entire Association, there were 105 persons from 14 states attending. This year there were 160.

The scene of this great occasion was the Pyrrhotite Mine on Anthony's Nose, near Peekskill, N. Y. And it will long be remembered as a most successful affair.

A feature of this outing was the information booth which included a display of representative rocks and minerals found at the mine. Peter Zodac was stationed here, and a busy man he was asking visitors to register, answering questions, identifying specimens, and explaining those on display.

Another busy man was the director, guiding the groups of visitors over the

large area covered by the workings of this mine.

Another feature were the numerous signs pointing out items of interest such as a block fault, a pegmatite dike, glaciated rock, etc.

But without a doubt, the most popular feature of all was the refreshment stand. The ice cream and cold drinks were a mighty welcome relief from the heat of the day. Many also sought relief at the entrances of the two tunnels which poured forth a steady stream of cold air.

While pyrrhotite, pyrite, and magnetite were found in great abundance, it was the pretty incrustations of selenite crystals, crystals of apatite, and the rare mineral langite which aroused the greatest interest. While a complete check of the minerals collected is not possible, it is believed that specimens were found of practically all the minerals known to occur at this locality. (See article on the Pyrrhotite Mine, June, 1933, issue of ROCKS AND MINERALS.)

NORTH CAROLINA

Mark Sheppard, Director

Report will appear in December number.

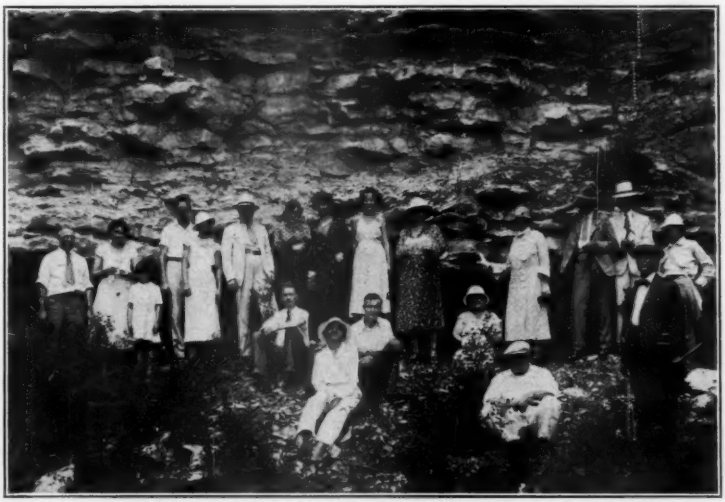
OREGON

F. S. Young, Director

A group of 60 people, most of whom were members of the Oregon Agate and Mineral Society, conducted a most successful caravan to mineral localities in central Oregon.

Leaving Portland at 4:00 A. M., the party first visited the Antelope region where a few hours were spent at this well-known locality searching the sage-covered hills for specimens. Two large fine quartz crystal-lined geodes were found as well as numerous small ones. Large quantities of jasper, agate and chalcedony were obtained as well as several large pieces of translucent "moss-jasper" which appeared to be of gem quality. Mr. J. L. Renton took motion pictures and Mr. F. S. Young took snapshots of the caravan in action.

From Antelope, the caravan took the short cut to Ashwood, where the party was met by Mr. L. H. Irving of Madras, who acted as guide for the remainder of the trip. A number of localities were visited and many fine specimens collected. An unusual mineral found, was a variety of chalcedony which is pure white in color



NEBRASKA OUTING

The rock shown in background is Pennsylvanian limestone where most of the fossil specimens were collected.

and contains circular markings scattered throughout. The circles or dots varied in size up to about ¼ inch and were of many colors so that they made pleasing contrasts in color and patterns with the main mineral. The nature of the dots has not yet been determined and locally the specimens are known as "polka-dot agates." The ladies in the party left this locality reluctantly as the material was readily obtainable in a large variety of patterns and colors and was especially attractive to the feminine eye.

The last locality visited was near Gateway where nodules were found having a core filling of agate and common opal.

The party reached Portland late in the evening after covering a little over 350 miles.

SOUTH DAKOTA

Mrs. Edna M. Scott, Director

The largest number to be recorded—200—gathered under shady birch and aspen trees near a cool mountain spring, on the property of the Rose Quartz mine, near Custer, to usher in the first annual outing of the Rocks and Minerals Association in South Dakota. Mrs. Edna M. Scott, proprietor of the mine, whose love for the outdoors has grown through a lifetime in the Black Hills, was hostess for the day. Following the picnic lunch, an informal and cleverly arranged program was listened to with interest.

Mr. Charles Scott of Rapid City, extended greetings of welcome to the visitors, many of whom came from distant places as California, Colorado, Nebraska, New Jersey and Canada.

Mrs. Bess Gearhart Morrison of lyceum fame, vacationing in the Hills with her husband, Lorenzo Morrison of Lincoln, Nebr., read a poem "To a Rock Fern."

Dr. W. H. Over, curator of the State University Museum, spoke of the beauties of the Hills.

Dr. Searight of the Department of Geology at the University urged Black Hills people to look for the neglected fossils in the mountains, those tiny bits that speak of animal and vegetable life a billion years ago.

Dr. E. P. Rothrock, State Geologist, voiced his appreciation of a gathering where the commercial or profit side of geology was not uppermost. He urged his hearers just "to enjoy" the mountains once in a while.

Mr. Badger Clark read two of his poems. One treated of the Hills as they were when the white men came. The other was "I Must Come Back."

Mr. Ed Handlin, state booster, told of the Black Hils exhibit at the Century of Progress in Chicago.

Mr. Francis Case, who introduced the several speakers, then presented Mrs. Scott. All present expressed their appreciation for the joys of the day and added that they hoped they might gather again next year.

TEXAS

Clarence L. Brock, Director

That world famous mineral locality in Llano County, Barringer Hills, was the scene of the outing in this division. Many fine specimens were collected, particularly those of the rare earth variety, many of which are not known to occur anywhere else in the world.

Mr. Brock motored from Houston with his brother Vernon, leaving there at noon the day before the outing. Staying over night at Burnet, they made a short trip to the mines of the Ceylon Graphite Co. early the next morning. Through the courtesy of Mr. Frank Pavitte, some nice specimens were secured for the Houston Museum.

Arriving at Barringer Hills at about 10:00 A. M. they were met by the other collectors attending this outing, a total of ten being present. It was reported however, that a few had left just before the director arrived.

A visit had first been paid to Mr. William Niven who opened up the mine at this locality more than 40 years ago, with the intention of inviting him to join the group. But Mr. Niven, who is now 83 years of age, was not well enough to attempt this.

Leaving at 2:30 P. M. the return trip to Houston was made via the great Hamilton Dam and Marble Falls. Over 500 miles were covered on the complete round trip, and well worth every mile of it.

UTAH

Junius S. Hayes, Director

An excursion of 12 people visited Mueller Park in Bountiful Canyon as the

feature of this state's outing. About 25 different rocks and minerals were identified and collected by the members of the group. A keen interest was shown by all and many questions were fired at the director.

The rock formation in the park, which is just a few miles north of Salt Lake City, and particularly in the region just adjacent, is composed of igneous rocks of Cambrian, or pre-Cambrian age which have been highly metamorphosed. The specimens collected by the party consisted of those minerals found in the gneisses and schists. Also some wonderful pegmatites were obtained. Boulders and pebbles of quartzite and limestone were observed scattered in the stream bed, float from further up the canyon.

To make the trip as interesting as possible, the director decided to give a demonstration in the panning of gold, inasmuch as there is such a widespread interest in this at the present time. Though there is no gold in the region of the park, it was felt that this would be of interest and value just the same. Some dirt and gravel from the bank of the stream was panned which resulted in just a small amount of heavy sand remaining in the pan. Then after several in the party had tried their hand at this, the director, as a surprise, poured about a pound of rich gold concentrate into the pan. When the panning had progressed to the proper stage, the gangue material was worked to one side off the top of the particles of gold which spread out in a most beautiful fashion. This passed the stage of interest and almost became excitement.

All in all, the outing accomplished all that was expected, and more too.

WASHINGTON

Charles O. Fernquist, Director

No report submitted.

WISCONSIN

Charles H. Hocking, Director

Enthusiasm was at its pitch when a most interesting and successful field trip to the lead and zinc mining region of Wisconsin, with the objective as Dodgeville, was made on the bright and sunny day of July 9th. A group of 83 persons, residents of 10 States and of Canada, assembled at Madison, the capital of the state, under the leadership of Mr. Charles H. Hocking, assistant instructor at the University of Wisconsin.

Copies of the itinerary and a seven page historical sketch of the region, both of which had been prepared for the occasion by Mr. Hocking, were distributed to the group just before starting. Every point of geological, historical, and scenic interest to be seen on the trip was covered in the itinerary. Several stops were made along the way to observe more fully some of these features. Genuine interest was exhibited everywhere.

On reaching Dodgeville, the destination, the group was met by Mr. Ed McKinley, owner of the land on which the mines are located, who conducted the visitors through his mill and explained the various grinding processes. Then he did the same at the shaft of the mine. Through his generosity, the members were invited to collect specimens, and a nice selection was offered and collected. Mr. Thomas Hoskins, an 81 year old miner, later explained the operations of an old blast furnace which still stands.

Many thanks are due to Messrs. Gilbert O. Raasch, C. E. Brown, Ralph Wood, and H. B. McCarthy of Madison and to Eddy Mundy, Ed McKinley, Thomas Hoskins, and Roy E. Thomas of Dodgeville for their various efforts in making this outing a huge success.

The original plan for the outing of this division called for a trip to the Iron Ridge section, starting from Milwaukee, with Mr. Benedict P. Bagrowski directing. Later, however, it was decided, at Mr. Hocking's suggestion, that the lead and zinc mining region would offer a more interesting and worthwhile trip. Accordingly, plans were altered, and arrangements were made with him to take charge with the city of Madison as headquarters and to make the trip to Dodgeville. In spite of this change, much credit is due Mr. Bagrowski for the success of this outing, for it was he who worked out all the arrangements with Mr. Hocking and in other ways contributed his services.

CANADA (Ontario)

No outing held.

Respectfully submitted,
FRED W. SCHMELTZ,
National Director of Outings,
2510 Maclay Ave.,
New York, N. Y.

Aug. 1, 1933.

The Gem Department

Conducted by GILBERT HART

THE OPTICS OF BRILLIANT CUT GEMS

BY J. H. HOWARD

The design of a good cutting for a brilliant gem is not a matter that can be successfully undertaken without some preliminary study. The physical properties of the material as relates to its behavior in light must be known.

Before the amateur lapidary who is cutting brilliants can realize the fullest satisfaction from his work he must be able to determine what proportions are best to use with any given gem material. Any good text book of physics will give all the needed information but not always in a form that is readily usable for the man who has not studied physics.

This paper does not profess to be an authoratative treatise on the optics of gems. It is far from making such claim. It will present no opinions as to the best proportions to be used with any gems. It is offered solely for the purpose of setting down in convenient form the rules that are required by the man who wishes to know what he is doing when he either cuts or inspects a brilliant gem. We have all seen two gems of the same material, one beautiful and showy, the other dead and unattractive and have wondered what caused the difference. The difference was probably in the cutting. Some study of what happens to light in a gem stone will help us to understand why one gem is sparkling and alive while another of the same material and general shape will be sleepy and only spotted with light.

It will be found that the cutter can make or mar a gem; that within reasonable limits he has perfect control over the light that enters the crown; that he can bring most of it back out of the table or most of it back out of the side facets. And we will learn that neither of these conditions makes for an ideal cutting but that as much as possible of the entering light should be returned through the crown of the gem and well distributed between the table and the side facets so that some facet or group of facets will appear brilliant when the gem is observed from any one of many positions and when the light is entering from any of several directions.

This makes the problem a very complex one. It cannot be covered by any one formula. There are many factors to be considered. Among them are the refractive index and critical angle of the gem material, the inclination of both front and rear facets, the ratio of depth of crown to depth of pavillion and the width of the table. Before our study has progressed very far it will be seen that there is no such thing as a perfect cutting; that the proportion arrived at and determined to be best for a particular material is in reality a decided compromise between conflicting factors.

It is only by a careful study of many shapes and proportions and the graphic portrayal of the behavior of light in each, that one can get a real picture of what happens in a brilliant cut gem. This paper will attempt to direct the method of procedure to be followed in such an analysis.

Before we undertake such a study we must realize that we are dealing with materials which like light, always obey certain laws. We must learn these laws and the definitions and descriptions that make them understandable to us.

The crown of a gem is that portion of the gem above the girdle.

The girdle of a gem is the edge which bounds the widest part of the gem.

The pavillion of a gem is that portion of the gem below the girdle.

The normal is a perpendicular erected at the point where a ray of light strikes a surface. See Fig. 1.

Reflecton is what takes place if a ray of light strikes a surface and "glances off" instead of entering the material which it struck.

Refraction is what takes place if a ray of light strikes a surface and enters the material along a new path instead of being reflected.

The angle of incidence is the angle with the normal made by the light ray where it strikes a surface. Angle B Fig. 1 is the incident angle of ray A.

The angle of reflection is the angle made with the normal by the reflected ray. Angle B-1 is the angle of reflection of ray A-1 in Fig. 1. The angle of reflection is always equal to the angle of incidence. (Angle B-1=Angle B, in Fig. 1).

The angle of refraction is the angle with the normal made by a refracted ray of light. A ray of light passing from air into a gem will always change its direction at the surface and will bend toward the normal. A ray passing from a gem into air will change its direction at the surface and will bend away from the normal. Therefore the angle of refraction is never equal to the angle of incidence but is always greater than or smaller than the angle of incidence. (In Fig. 1 angle D-1 is never equal to angle D.)

The critical angle is the angle with the normal, at which a ray of light traveling in a gem will neither leave the gem as at A-1 Fig. II nor be returned by reflection into the stone, as at C-1, but will, on striking a surface coincide with it. To repeat, ray A in Fig. II striking at less than the critical angle will be refracted out into the air. Ray C. striking at greater than the critical angle will be reflected back into the gem. Ray B will exactly coincide with the surface. The rule for the determination of the critical angle is:

$$\frac{1}{\text{Refractive index of material}} = \text{Sine of critical angle.}$$

Example: What is the critical angle of topaz? The refractive index of topaz is 1.62. Then, 1 divided by 1.62 equals .61728.

From a table of sine functions we find that this figure is the sine of 38° 10′ approx. which is the critical angle of topaz.

If a ray of light traveling in air strikes a gem it will enter the gem. If it strikes it at normal it will enter at normal. If it strikes at an angle other than normal, as we have already learned it will bend toward the normal. The rule for the amount of its bending is:

$$\frac{\text{Sine of angle of incidence}}{\text{Refractive index of material}} = \text{Sine of angle of refraction.}$$

Or referring to Fig. 1:

$$\frac{\text{Sine angle D}}{\text{Refractive index of material}} = \text{Sine angle D-1.}$$

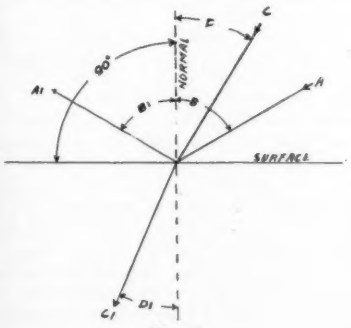


Fig. I

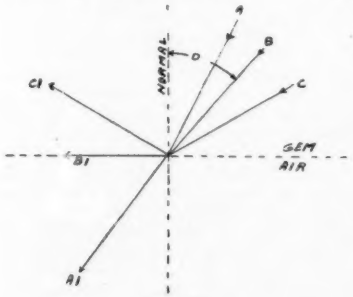


Fig. II

Example: If a ray of light travelling through air strikes the surface of a topaz at 35° from the normal, at what angle with the normal will it enter the topaz? Substituting in the above formula, .57358 (the sine of 35°), divided by 1.62 (the refrative index of topaz), equals .35406 which is the sine of 20° 45′ approx. which is the angle with the normal at which the ray will enter the gem.

If a ray of light traveling in a gem strikes a surface at an angle with the normal smaller than the critical angle of the material the ray will not be reflected but will be refracted out into the air. The ray will, as we have already seen, bend away from the normal. The rule for the amount of this bending is:

(Sine of angle of incidence) x (Refractive index of material) = (Sine of angle of refraction).

As an example of this, reverse the conditions of the last problem. If a ray of light traveling in topaz strikes a surface of air at an angle of 20° 45′ from the normal, at what angle with the normal will it enter the air? Substituting in the formula just give:
(.35406 = the sine of 20° 45′) x (1.62 = the refractive index of topaz) = (.57358 the sine of 35°).

If a ray of light traveling in a gem strikes a surface at an angle with normal greater than the critical angle of the material, it will be reflected back into the gem and the angle of reflection will be equal to the angle of incidence.

The above definitions and formulae are the only ones that are required for this work. It is urged that the beginner in this study work out a few typical problems to get the rules well-fixed in mind. But for convenience in actual work the chart, Fig. III is given. It plots with fair accuracy, and for refractive indices of materials most commonly used as gems, the amount of bending of light when it passes from air into gem and from gem into air. The critical angle of each material may be read directly above the intersection of the refractive index curve with the 90° line. For example, what is the critical angle of quartz which has a refractive index of 1.55? Reading above the intersection of the 1.55 line with the 90° line we find the answer is "slightly above 40°."

To show the application of the rules involved it is worth while for us to work out one diagram of a brilliant stone. Suppose it is desired to know what proportions should be used for a round brilliant of quartz. Quartz has a refractive index of 1.55 and a critical angle of slightly above 40°. Begin by drawing a section through an assumed shape. We will try placing the front main facets at an inclination of 45° from the plane of the girdle and the rear facets at 41° from the girdle. See Fig. IV. Use a protractor for laying out all angles of gem and of light rays. Let the crown be one half as deep as the pavillion. To avoid confusion show the rays entering only one half of the crown area. Draw ray A, striking at normal and entering at normal. (Keep in mind that all figures given in tracing these rays are angles with the normal.) Ray A strikes the first interior surface at 41° and is reflected at 41°. It strikes the second surface at 56° and is reflected at 56°. It then strikes the interior surface at 15° and as this is less than the critical angle of quartz the ray is going to pass out into the air. Reference to chart Fig III shows that if light traveling in a gem with refractive index of 1.55 strikes an air surface at an angle of 15° with the normal it will pass into the air at an angle of 24° with the normal.

Ray B is traced in the same way and presents no new conditions.

Ray C is different in that it strikes the gem at an angle of 45°. Again referring to Table III we find that this ray will enter the gem at an angle of 27° with the normal. From this step there is nothing new in the tracing of ray C and ray D is similar.

When the paths are all traced it will be found that the light entering the main side facets is all lost out the back of the gem and that all light entering the table comes out the crown fairly well distributed over the table and the side facets. (Further investigation will show that it is not practicable to save the light that enters the side facets of a material of as low refractive index as quartz). This result is what we want except that none of the rays are returned through the center of the table and the stone may therefore have an "empty" look when light enters at the normal.

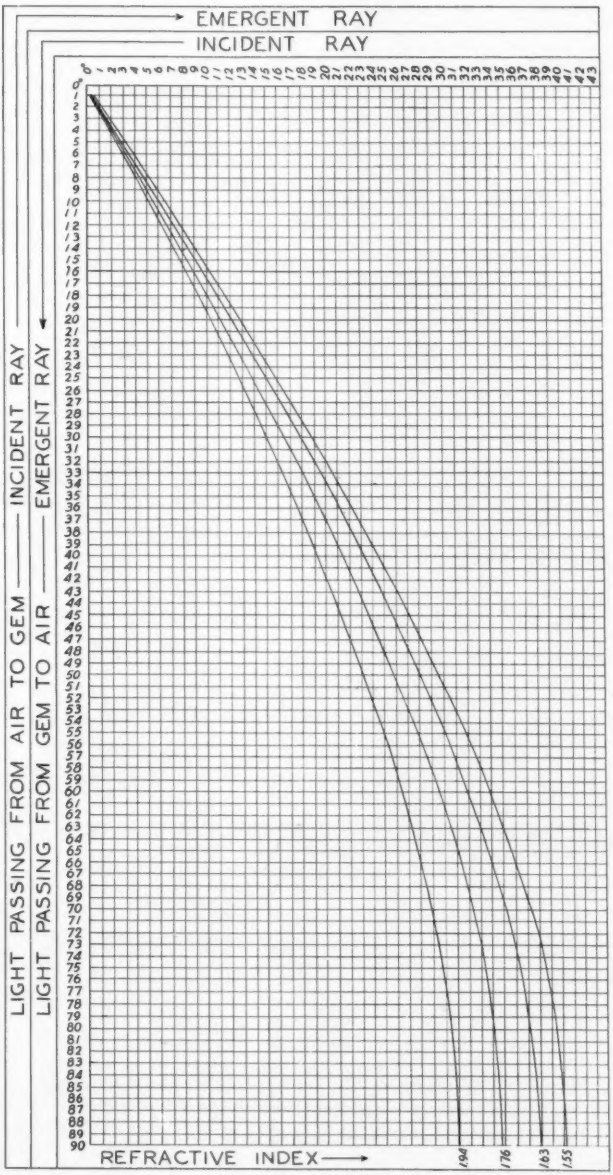

EMERGENT RAY
INCIDENT RAY
LIGHT PASSING FROM AIR TO GEM —— INCIDENT RAY
LIGHT PASSING FROM GEM TO AIR —— EMERGENT RAY
REFRACTIVE INDEX
194
176
163
155

Fig. 111

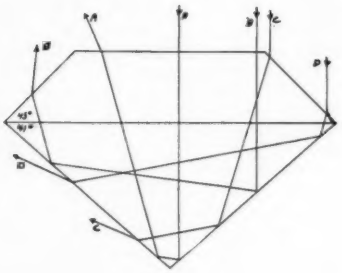


Fig. IV

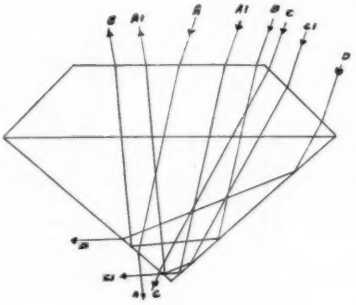


Fig. V

RAY	STRIKES GEM	ENTERS GEM	STRIKES FIRST SURFACE	STRIKES SECOND SURFACE	STRIKES THIRD SURFACE	LEAVES GEM
A	NORMAL	NORMAL	41°	56°	15°	24°
B	NORMAL	NORMAL	41°	56°	30°	51°
C	45°	27°	59°	38°		72°
D	45°	27°	59°	38°		72°

Table to accompany Fig. IV.

RAY	STRIKES GEM	ENTERS GEM	STRIKES FIRST SURFACE	STRIKES SECOND SURFACE	STRIKES THIRD SURFACE	LEAVES GEM
A	20°	13°				47°
A-1	20°	13°	54°	45°	5°	8°
B	20°	13°	54°	45°	5°	8°
C	25°	16°	12°			19°
C-1	25°	16°	70°	28°		47°
D	25°	16°	70°	28°		47°

Table to accompany Fig. V.

But it is not yet time to condemn the design. Draw another diagram of a similar shape and show on it the same series of rays entering it at 20° from the normal and see how the gem looks under this condition. Trace through the gem all the rays. It will be found that the band of light leaving the crown has moved toward the center of the stone. A little study of these two diagrams and perhaps an intermediate one showing light entering at 10° from the normal will probably convince the student that this particular proportion is about as good as can be gotten for this material.

Let us repeat a statement already made. It is to be regretted that the light entering the side facets is all lost. But investigation will show that this fault is inherent in material with as low refractive index as quartz has. As we pass to materials with higher refractive indices it becomes increasingly easy to make more and more of the entering light effective.

In actual practice drawings should be made with the girdles at least eight inches wide to insure reasonable accuracy of the angles.

Drawings should be made of whatever gem is to be investigated. By repeated trials with varied inclinations of both front and rear facets, and keeping in mind the ideal conditions of distribution already set forth, the best design may be chosen and the designer may have the easy conscience of the man who has actually done his job and not merely guessed at it.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST, 24, 1912.

Of Rocks and Minerals published Quarterly at Peekskill, N. Y. for October 1, 1933.

STATE OF NEW YORK, } .ss.
COUNTY OF WESTCHESTER }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Peter Zodac, who, having been duly sworn according to law, deposes and say that he is the Editor and Publisher of the Rocks and Minerals and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Name of	*Post Office address—*
Publisher, Peter Zodac,	Peekskill, N. Y.
Editor, Peter Zodac,	Peekskill, N. Y.
Managing Ed., Peter Zodac,	Peekskill, N. Y.
Business Mgrs., Peter Zodac,	Peekskill, N. Y.

2. That the owners are: Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Peter Zodac, Peekskill, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

PETER ZODAC, Publisher.

Sworn to and subscribed before me this 7th day of August, 1933.

MAUD L. BARRETT.
(Seal.) Notary Public.

My commission expires March 1934.

A new suggestion that life exists elsewhere than on the earth was recently published as the result of experiments on meteorites conducted by Dean Charles B. Lipman of the University of California These seemed to indicate the presence of extra-terrestrial bacteria on the stone messengers from outer space which arrive on the earth.

The Amateur Lapidary

Conducted by

J. H. HOWARD*
504 Crescent Ave., Greenville, S. C.

Amateur and professional lapidaries are cordially invited to submit contributions and so make this department of interest to all.

*Author of—*The Working of Semi-Precious Stones.* A practical guide-book written in untechnical language for those who desire to cut and polish semi-precious stones.

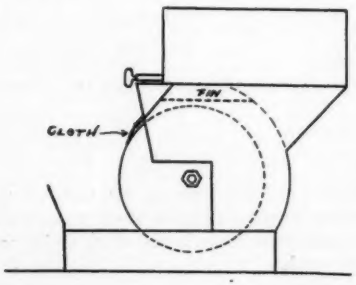
REMARKS BY A BEGINNER

—By—

ARTHUR KNAPP

Lapidary work is a good hobby for a mechanic because most of the machinery and appliances may be assembled by him at a great saving in cost over getting things made or purchasing ready-made machinery.

A great many of the fittings sold for use in the home carpenter shop may be converted into lapidary machinery. In fact the writer's machinery is entirely from this source. The shafts, bearings, collars, pulleys, thrust bearings, belts, in fact everything necessary for a vertical shaft machine, are not expensive and are easily built into a first class machine. The writer uses aluminum sanding discs as backing for lead and felt laps and a die-cast iron sanding disc as a lap for facet cutting.



The mechanic should be able to make splash guard equipment which is eminently satisfactory. The writer has been using round cracker cans from the grocer, as a starting point for most of his guards and as a source of a good grade of tin.

The accompanying sketch shows a very satisfactory guard for horizontal shaft grinding wheels. The use of a cloth wick riding on the stone provides an ample supply of water but prevents fine spray from flying off of the stone and on to the operator. Two fins should be put above the wheel on the inside of the shield to direct water to the center of the wheels rim. The cloth wick will direct this water back to the wheel.

The writer has been annoyed with the bumps which develop so quickly in wooden laps. Presdwood, made by the Masonit Corporation, makes excellent discs for coarse pastes and battle-ship linoleum makes wonderful laps for medium pastes. A groove may be worked into thick linoleum for use when polishing cabochons.

A METHOD OF POLISHING TOPAZ

Topaz is one of the gem materials especially difficult to polish and many inquiries have been received as to the best method of handling it.

Topaz has one distinct cleavage. Care must be taken in orienting the gem in the crystal, to not have any facet exactly parallel to the plane of cleavage. The table especially should be cut as far as possible from the cleavage plane. The gem should be sawed and roughed to shape just as is done with any of the ordinary gem materials. This operation presents no unusual difficulties. The facets are then cut in the usual way with cast iron lap and No. 600 carborundum.

For polishing use "Damascus Ruby Powder" on a tin lap. Certain precautions must be taken. If the ruby powder paste is daubed on the lap too thickly and heavy pressure is applied the surface of the gem will immediately be plowed into a series of furrows. Have the lap in good condition as has been described in a previous article in these pages by scoring the surface and polishing the high spots.

Apply the paste very sparingly. It is hard to describe how to get the abrasive on the lap without having it too thick. If a level teaspoonful of ruby powder is mixed with water ¾ inches deep in a vessel 3 inches in diameter and kept stirred only fairly frequently the consistency will be about right. Apply the mix with the finger tips, never with a brush.

Hold the gem against the lap with as light pressure as possible, barely touching the lap. From 8 to 10 seconds of this will probably be enough for one of the large facets on a stone of around 1 carat. Then without applying any more paste allow the lap to dry completely. Then get final polish on this dry lap using light to medium pressure for several periods of from 1 to 3 seconds each with time in between for the stone to cool. A total of 10 to 20 seconds of the dry polishing should give a perfect surface. If there should be a low edge on the facet or a deep furrow to remove, it may be necessary to apply the paste wet a second time but usually one application will complete a facet.

The operation seems to be very sensitive to the amount of paste on the lap when lap is either wet or dry and to pressure when the lap is wet. The success of the method depends on having the paste thin enough.

My own experience indicates that light pressure on the wet lap is preferable but the worker is again cautioned to not accept any statement regarding gem cutting as correct and final but to always experiment. One of my correspondents has reported that he gets better results with heavy pressure on the wet lap.

If, in spite of all precautions, scratching persists when using the wet lap, the job may be done entirely on a dry lap. This adds considerably to the time required as the stone heats very rapidly on the dry lap.

—J. H. HOWARD.

DIRECTORY OF ACTIVE AMATEUR LAPIDARIES

Directory of Active Amateur Lapidaries

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Buchanan, Roby M., Hawk, N. C.
Cherry, Thos. A., Logan, Iowa.
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Dake, H. C., 2385 N. W. Thurman St., Portland, Ore.
De Haven, Hugh, 156 East 79th St., New York, N. Y.
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Howard, J. H., 504 Crescent Ave., Greenville, S. C.
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Siegfried, H. I., Denver, Ill.
Volmer, John, Brock St., Ashland, Pa.

(*Continued on Page* 137)

Field Museum Notes and News Items

Contributed by

THE FIELD MUSEUM OF NATURAL HISTORY
Chicago, Ill.

The story of man, from a million years down through the dim past to the dawn of history about 5000 B. C., is graphically told by comprehensive exhibits in a new hall at the museum opened to the public for the first time Tuesday, August 1st.

The principal feature in this "Hall of the Stone Age of the Old World" is a series of eight dioramas containing life-size restorations of the prehistoric ancestors of the human race, with settings reproducing the caves, rock shelters, lake dwellings, and other primitive habitations they once occupied. These groups have no counterpart in any other museum of the world, and leading anthropologists including such eminent authorities as Sir Arthur Keith and Prof. G. Elliott Smith, of England, the Abbe Henri Breuil of France, and others, have pronounced them the finest restorations of prehistoric men ever made. These and other scientists of both the United States and Europe cooperated with Field Museum in the preparation of this hall which presents the most complete, accurate and interesting picture that present knowledge permits of the lives, cultures, and physical characters of prehistoric races.

The exhibits represent the results of years of research, of several museum expeditions, and of intensive collecting of archaeological material. The general plans for the hall were worked out by Henry Field, assistant curator of physical anthropology at the museum, who conducted the several expeditions necessary to study the various sites reproduced and to assemble the comprehensive series of archaeological objects displayed. Dr. Berthold Laufer, curator of anthropology, collaborated with Mr. Field in making and executing the plans.

The life-sized figures of the various types of prehistoric men, modeled in attitudes characteristic of tasks in their daily lives, are the work of Frederick Blaschke, well-known sculptor of Cold Spring-on-Hudson, N. Y., who accompanied Mr. .Field to Europe and made studies of authentic remains of prehistoric men and of sites where such remains have been found. Backgrounds for the groups are the work of Charles A. Corwin, staff artist of the museum. Among contributors to funds to meet the cost of creating this hall are Marshall Field of New York, and Frederick H. Rawson and Silas H. Strawn of Chicago, all of whom are members of the museum's board of trustees.

The dioramas are arranged in chronological order, each depicting a scene in the life of one of the periods of prehistoric man. Opposite each is a case containing archaeological material of the period represented by the diorama. Additional cases contain material representing still other stages in man's development. Included in these supplementary displays are original stone and bone implements, household objects, sculptures, and other artifacts made by prehistoric men, reproductions of important specimens of prehistoric human remains as well as some original skeletal materials, and fossil specimens of the animals of each period. Some of this material dates back as far as a million years ago. The first of the dioramas represents a scene of the Chellean period, approximately 250,000 years ago.

A tour of the hall starts with this Chellean scene, which represents the period identified with the earliest human remains ever found in Europe. The climate at this time was mild, and elephants, rhinoceroses, and hippopotami

wandered over Europe. In the museum group there are seen, squatting in the foreground beside a fire, two Chellean hunters, one of whom is chipping flint to make a hand ax for hunting. In the distance is a meandering river on the banks of which are a number of animals. Research has revealed only fragmentary facts about this era, and the museum group presents a dim, moonlight scene symbolizing the darkness of our knowledge. In a supplementary case are casts of the most famous prehistoric remains discovered—those which scientists have labeled Sinanthropus (the Peking man), Pithecanthropus erectus (Java ape man), Eoanthropus (Piltdown man), and Homo heidelbergensis (the Heidelberg man).

The second diorama presents the Mousterian period, about 50,000 years ago. This is the time of the Neanderthal man, whose remains have been found in many localities in western Europe. Neanderthal man is the earliest type of which complete skeletons have been found. From the evidence available, he was the first to seize a wife and protect her from animals and other men. This museum group, therefore, represents the dawn of family life. The diorama shows a Neanderthal family on a sandy platform outside the entrance to the Devil's Tower shelters at Gibraltar. Silhouetted against the deep blue of the Mediterranean stands a young man with a wooden club in his hand. Squatting besides the glowing embers of the fire is the father of the family, watching mussels open as the heat penetrates their shells. His small son, about five years old, is bringing a twig for the fire. In a large cleft in the rock the mother can be seen carrying her youngest baby on her hip. Near the group are cases containing a variety of Neanderthal human remains and Mousterian cultural objects.

The Cro-Magnons, a race from Asia that invaded Europe about 30,000 years ago, appear in the third diorama. These people were very different physically and culturally from their predecessors, and whereas the Neanderthalors finally died out entirely and had no direct link with the modern human race, the Cro-Magnons are believed to have belonged to the direct ancestral life from which large groups of modern peoples are descended. The culture of the Cro-Magnons has been named Aurignacian because of the discovery of skeletons and flint tools identified with them in the cave of Aurignac near the foothills of the Pyrenees. An abundant game supply at this time made the struggle for food less intense for the Cro-Magnons, and in consequence of possessing more leisure they were responsible for the birth of art. They adorned their cave homes with lifelike carvings and paintings of animals and humans. The museum group reproduces the caves of Gargas in southwestern France, with a frieze of human hands outlined on the walls. An Aurignacian man is seen resting on his knee with his left hand held against the wall, fingers outspread. In his right hand is a hollow bone tube which he holds against his lips to blow powdered red ochre around the outline of the other hand. On the wall, illuminated by a fire and a sandstone lamp in which animal fat was burned, are many other outlines of hands, as well as drawings of elephants and bison. Personal ornamentation was developed in this period, and in a supplementary case are remarkable Aurignacian necklaces of beads made from mammoth ivory, shells, teeth and pebbles. These are probably the oldest necklaces ever discovered.

The fourth diorama presents a scene of the Solutrean epoch when a race physically resembling the modern Eskimo came into southwestern France and northern Spain. The group reproduces the famous Solutrean frieze in the valley of Le Roc where, on a cliff, early artists left a semicircle of large stone blocks upon which are carved a masked human dancing, horses and other animals, a muskox charging a fleeing man, and other pictures. In the foreground of the museum group is seen a Solutrean sculptor, of Mongoloid type, carving a horse on a block of stone.

In the fifth group the Magdalenian period is taken up. Coming into France, probably from the northeast, and meeting more favorable conditions for obtaining food, these people developed a higher form of culture, and produced the finest naturalistic art of prehistoric time. The museum group reproduces the Cap Blanc rock shelter in the Dordogno region of France where the most striking example of Magdalenian sculpture—a frieze of six horses in high relief on the

wall—was discovered. In an adjoining case is exhibited the original Cap Blanc skeleton—the only complete Magdalenian skeleton ever brought to the United States. The remarkable state of preservation of this skelton of a youth who died some 25,000 years ago makes it one of the most important archaeological treasures in this country. In a case opposite is a reproduction of bison sculptured in clay, which are preserved in the innermost part of the cave of Tuc d'Audoubert in the Ariege district of France. Magdalenian harpoons of bone, a perfect bone needle, limestone slab lamps, and other artifacts are also exhibited.

The Mesolithic period, when the transition from the old to the new stone age began, is the subject of the sixth diorama. The domestication of animals, an important advance toward modern civilization, is dramatically illustrated in this group, which shows a wild boar hunt at the entrance to the cave of Mas d' Azil. Dogs are assisting two young Azilian men at close quarters with an enraged wild boar which is defending its mate and young pigs. The hunters use wooden spears with flint lancepoints. One holds three dogs in leash with a rawhide strap.

The seventh group is definitely in the Neolithic or new stone age. The scene is at Carnac in Brittany where there have been left standing over a stretch of two miles ten avenues of menhirs or large stones marking burials. The place is believed to have been used for worship of the sun, in a religion combined in some way with a cult of the dead. The group shows a priest with hands outstretched toward the rising sun, welcoming the birth of a new day.

The eighth group represents a community of Swiss Lake Dwellers, representative of the later neolithic culture which was soon to be followed by the dawn of history with the rise to dominance of such civilizations as those of Egypt, Greece and Rome. The group shows a beautiful early morning scene on Lake Neuchatel. In the foreground two fishermen are hauling in their seine. Snowclad Alpine peaks loom in the background. Built out over the water on foundations of log piling is a village with its cluster of thatched wooden houses. Exhibited near-by is a fine collection of objects from Lake Neuchatel, including implements of bone and stone, pottery, examples of weaving, samples of charred wheat and barley, seeds of various plants, sections of wooden piles, and objects of bronze and iron, indicating the extent of the progress made during this age in the beginnings of modern arts, industries, and construction engineering.

"Mineral moonlight" has been placed on exhibition in the department of geology at the Museum. It consists of two exceptionally large and beautiful crystals of selenite, having the form of prismatic columns about twenty inches high. They are transparent and have a soft luster which suggests moonlight. This luster, states Henry W. Nichols, assistant curator of geology, is like that of the selenite column in the fabled temple of the oracle which Rabelais described as having "a splendor like that of Hymettian honey."

The suggestion of moonlight in the luster of selenite has been recognized from remote antiquity, Mr. Nichols says. The Chaldean astrologers attributed selenite to the moon. The name, selenites, given to the mineral by the Greeks, means, "belonging to the moon." Selenite is the pure transparent form of the common mineral gypsum, which in its ordinary occurrence is a common looking rock used for making plaster of paris. Despite its attractiveness, selenite is not used as an ornamental stone because it is too easily scratched and marred.

An interesting collection of dendrites —branching figures which look as if they were painted in some dark pigment on the surface of the rock in which they form—are on exhibition in the department of geology at the museum. They are caused by water with minerals in solution penetrating narrow seams in rock.

How the limestone deposits of the world are slowly migrating from the temperate and arctic zones to the tropics was described in the May issue of **Field Museum News**, monthly bulletin published for the several thousand members of the Museum. This movement, according to Henry W. Nichols, associate curator of

geology, is a strange consequence of the changes which have occurred in the world's climate since Paleozoic time. Mr. Nichols writes, in part:

"Although millions of tons of limestone are transported by natural forces to the tropics annually, this quantity is so small in comparison with the entire body of limestone that a geological age must elapse before the change in distribution becomes apparent. Limestone is slightly soluble in surface and circulating underground waters. Much water loaded with limestone eventually finds its way to the sea where currents distribute it. The dissolved limestone is then extracted from the water by corals, shellfish, and other marine animals which make their skeletons or shells of it. From accumulation of these skeletons and shells most limestones are formed. As these animals are more numerous and active in the warm air and water of the equatorial regions than elsewhere, the greater part of the dissolved limestone is thus withdrawn from the sea water in the tropics.

This redistribution is due to the present cool climate of the temperate zones. In Paleozoic time when climates were more equable it did not occur. Limestones dissolved from the land then were as likely to be redeposited in one place an another. The fossil exhibits at the Museum show large numbers of corals, crinoids, and other lime-absorbing forms which lived in the Chicago climatic zone about 400,000,000 years ago. Among modern animals, however, such forms occur only as specimens from the tropics and semi-tropics."

Markings identified as having been made by a nearly stranded iceberg of the glacial period some 20,000 or more years ago appear on a large specimen of glaciated sandstone exhibited in the department of geology at the Museum. Interruptions in the lines indicate the rise and fall of the slowly moving berg on waves.

THE AMATEUR LAPIDARY

(*Continued from Page* 133)

CARBORUNDUM SAWS

For the occasional small sawing job, the carborundum saw will prove a wonderful help. If the amateur has a separate arbor rigged up for his sawing the small job is not any problem. But many of us use only one grinding head for all operations. When this is the case the small job of sawing is very annoying and many a good piece of gem material has been spoiled thru breaking, the worker hoping to get by with this instead of rigging up his saw. Mud or oil sawing is at best a messy job and involves much changing even to changing of speed, and calls for complete cleaning of equipment after the job is done.

The carborundum saw is the answer to such troubles. It has its disadvantages. It takes more power than the metal disc. It is not as fast. It throws water, but no worse than the grinding wheel. I have not found it satisfactory for making a large cut, though I may not have given it a fair trial. But none of these troubles are serious and they are to be weighed against the trouble of rigging up for a disc sawing job if only a little work is to be done.

Use a 1/16" x 8" x 60 C 4—Saw. Run at about 2000 RPM. Do not cement the work to your regular swiveled feeding board as, when the stone is fed to the saw in this way the saw seems to take on a glaze which slows down its work. If the stone is large enough to hold by hand, handle it this way. If it is not large enough for such holding, cement it onto a small stick and feed by hand. Put a tool rest or some similar platform close to the saw to aid in holding the stone. Do not hold the stone steadily in one position against the saw but rock it up and down so as to constantly present a new face to the saw. This seems to prevent glazing.

—J. H. HOWARD.

Our Junior Club - - -

Conducted by
ILSIEN NATHALIE GAYLORD

Dear Juniors:

It is nice, isn't it, that we are to have a department of our own here in ROCKS AND MINERALS, a sort of Club Room where we can come for our meetings, and talk about our collections and study new specimens?

They are so strange and interesting, rocks and minerals! Imagine a solid rock that you can bend, and another that was once alive and swam around in the sea. Then there are others so silky soft that people weave them into cloth, and others so light they easily float in water. It is about all these queer rocks and many others that we are to learn in our Club meetings here, and win as prizes in our Question Box.

There is a Club pin and password, too, and if any of you have not received them yet, just write us about it. Remember, any junior who wants to learn about the wonderful rocks and minerals of which our earth is made, may become a member of our Junior Club. Send your name, age, and address to

Junior Club
Rocks and Minerals
Peekskill, New York

WHERE TO FIND SPECIMENS

What shall we talk about first in our meeting today? Because many of our members have never yet made a collection of rocks and minerals, suppose we tell them of some good places to look for specimens. Really, interesting stones are to be found almost anywhere one happens to be. Often in a city curious stones come up in excavation diggings, and in the wreckage of old buildings. Usually the contractors will give permission to search these places. A marble cutter's monument shop is a fine place for samples of marbles. Quarries, too, are full of interesting stones.

In the cut-banks along railroads, in rocky ledges everywhere, and among the crumbling rocks at the feet of limestone, granite, and other cliffs, and among the pebbles on the beaches of creeks and lakes you can find all sorts of beautiful and curious stones. In the last two places you are apt to find those fascinating stones which are called geodes.

On the outside these goede stones look like ordinary pebbles. But when they are cracked open, the inside is a little cave filled with sparkling crystals. You may have to crack open many a disappointing pebble before you happen on a geode, but such beautiful little treasures are well worth the effort. Being hollow, they are lighter weight than the pebbles of the same size around them.

Among the creek and lake pebbles you are also apt to find bright red or yellow carnelians, pieces of red jasper, tiny red garnets and other crystals. In some of your cracked pebbles, too, you may find little hard bars of sand, or the fossil imprints of small shell creatures that lived and died long ages ago. In some of the cliffs along the sea are little fossil fishes and sea shells. Of course, from mines and their waste ore dumps you can get all sorts of interesting specimens.

The dilapidated stone fences on abandoned farms are usually full of queer stones. Many of them will probably be "pudding stones". Thousands of years ago these stones were buried deep in the mud beneath great glaciers, mountains of solid ice a mile high. When the ice melted, the mud hardened into rock, holding forever imprisoned in it these buried stones, like raisins scattered in a pudding.

A STONE THAT WAS ONCE ALIVE

In our collections we must not overlook even the common stones, for there is not a stone on earth but has had a wonderful history. That bit of limestone, for instance, or that piece of marble.

Once that marble was actually alive, swimming in the sea. That was many ages ago, when myriads of tiny sea creatures filled the ocean waters. As each little creature died, its wee shell sank to the ocean floor. Gradually these tiny shells formed vast beds of limestone, for it was of lime that the shells were made.

Finally came great upheavals in the earth, and the limestone beds were lifted up into high cliffs. The heat from all this tremendous pressure and friction was terrific. Where it was greatest it crystalized the limestone into marble.

That is how marble was once alive, floating in the sea. With a microscope often you can still see the tiny jaw bones and broken shells of those long ago wee ocean creatures. So you see, common as limestone is, its wonderful history as well as its usefulness to man makes it well deserving of a place in our collection.

THE FIRST STONE ON EARTH

That was granite. Our earth, so the scientists tell us, is made of three layers of rock. The center is magnetic iron. The middle layer is a soft volcanic glass. The top layer which includes the crust upon which we live is granite.

A billion years ago the earth was a mass of burning gas, floating in the sky. Gradually it cooled more and more, until the chemicals which formed the gas hardened into rock. The rock was granite. So that is how it came to be the first stone on earth. Later in our Club meetings we will make a careful study of this important rock, granite.

THE QUESTION BOX

What kind of rock is most necessary to man? Why is it the most necessary?

What is the next most important rock to man? Why is it so important?

Why does white marble sparkle in the sunlight?

Of what substance is natural white chalk made?

What is the general difference between rocks and minerals?

What is a metal?

PRIZES

A first grade prize will be given for the correct answers to all the questions.

A second grade prize will be given for the correct answers to any four of the questions.

A third grade prize will be given for the correct answers to any three of the questions.

Now who will win these fine prizes of beautiful and interesting specimens for your collections? The questions are graded so as to include both the older Juniors and the newest beginners.

Send your answers to JUNIOR CLUB, ROCKS and MINERALS, PEEKSKILL, NEW YORK.

Dealers and Manufacturers Department

Each item given below contains information of value to readers. For further particulars apply directly to the firms and please mention ROCKS AND MINERALS when writing.

Special Bulletin No. 1—A 7-page mimeographed price list featuring especially gemmy minerals has recently been issued by John M. Grieger, 405 Ninita Parkway, Pasadena, Calif. Mr. Grieger, having a large stock of choice minerals and desiring to close out some of them, is offering a number of specimens priced very attractively, below cost in some cases. And a number of interesting premiums are offered free to those who purchased over $1.00 worth from this list.

Club and Society Notes

Mineralogical Society of Southern California

The Mineralogical Society of Southern California and the Geology Department of Pasadena Junior College held a joint field trip April 21, 22, and 23 to the Mojave Desert. Seventy-five members and friends in eighteen cars made up the caravan led by E. V. Van Amringe, of Pasadena Junior College and secretary of the Mineralogical Society.

Climbing into the desert through the Sierra Madre Mountains, the Blue Canyon Slide of the San Andreas Fault was inspected. At Barstow, the Williams collection of polished and cut petrified wood, jasper, opal, onyx, travertine, turquoise, chrysacolla, and other desert rocks and minerals was visited in the house containing the exhibits and the work rooms. Glass cases and special lighting enhance the beauty of this most extensive and valuable collection gathered over a period of thirty years of desert exploration and trading.

North of Barstow the Upper Miocene Syncline furnished fossils of the small three-toed grazing horse, camels, deer, antelope, giant tortoise, and dogs. The field force of the American Museum of Natural History welcomed the caravan and showed the methods employed in obtaining, preserving, and shipping the fossils.

Camp was established in Odessa Canyon in the famous Calico Mountain silver mining district. Superintendent Cunningham of the Calico Mines conducted the party through the tunnels and explained the formations of ore carrying cerargyrite and embolite, with barite and jasper gangue, in fissures and pockets in Tertiary rhyolites, tuffs, and breccias. The town of Calico was founded in 1882 and has produced $10,000,000.00 in silver.

Crossing the range of the Calicos the ghost town of Borate was explored. It was established in 1883 and produced over $10,000,000.00 of borax in the form of Colemanite, a borate of lime. Tables and chairs in the restaurant still stand and pigeon cotes fastened to the steep narrow walls of the canyon lend an air of desolation to the village clinging to the hillsides. Geods of gypsum and Colemanite, and Howlite borax were found.

East of Barstow a deposit of bentonite, spherical calcite containing radial crystals and concentric rings of graphite crystals, mottled jasper and ribband jasper suitable for cutting and polishing furnished splendid cabinet specimens.

Tabular barite and barite pseudomorphic after quartz crystals were collected at the Barium Queen Mine in the Grapevine District five miles northeast of Barstow.

One hundred sixteen members and friends of the Mineralogical Society of Southern California met for the second annual meeting at the Arcadia Women's Clubhouse on June 12, 1933.

The club house was changed into a regular museum for the meeting, tables being lined up around the sides of the rooms to display the exhibits of cut and polished specimens entered in the amateur lapidary contest, the specimens donated as prizes for the contestants, and the individual exhibits of crystals, polished stones, and fossils offered for trading and for sale at the auction that followed later in the program.

Members of the society, Lillias Gilbert, Jimmie Gilbert, Jr., Mrs. Lillias Gilbert, and Emma Reed furnished vocal and instrumental music during the dinner.

After the annual report of the president and secretary, the election of officers took place with the following people elected; John Renshaw, of Arcadia, president; David B. Scott, of Altadena, vice-president; E. V. Van Amringe, of Altadena, secretary; Earl Calvert, of San Gabriel, treasurer; and directors elected were: F. G. McIntosh, of Beverly Hills,

Heber Clewett, of San Dimas, and Wendell Stewart, of Arcadia.

A skit, "The Texas Cowboy", consisting of vocal and instrumental music and dancing was performed by members of the society.

David B. Scott acted as auctioneer to sell specimens donated to the society for this purpose and to sell specimens for the members for which service a small commission was charged, the proceeds going to the treasury.

Fifteen members entered the amateur lapidary contest. The judges were Mrs. Gertrude S. McMullen of the Southwest Gem and Jewel Co., of Los Angeles, George H. Marcher, of Marcher Bros., Lapidarists, of Los Angeles, and Earl Hall of the Hall Jewelry Co., of Pasadena.

Four mineral prizes were awarded in each of two groups of specimens entered. The first group consisted of cabachon stones and sets suitable for mounting. Entries limited to twenty specimens. The second group consisted of gems and stones and minerals partly or wholly polished, with fifteen pieces the maximum for each entry.

In the first group the winners with the prizes were: first, John Renshaw, turquoise; second, K. N. Reed, of Pasadena, crocidolite; third, F. G. McIntosh, of Beverly Hills, lapis lazuli; fourth, Earl Calvert, of San Gabriel, tiger eye crocidolite.

The winners and the prizes awarded in the second group were: first, John Akers, of South Gate, vesuvianite; second, John Renshaw, rhodonite; third, Earl Calvert, blue chalcedony geode; fourth, S. C. Edwards, of Colton, a group of barite crystals.

The grand prize for the best specimen exhibited was given to John Renshaw, the award being a cut and polished rhodolite from North Carolina.

The lapidary contest prizes were donated by Messrs. Calvert, Degner, Everitt, McIntosh, Renshaw, Marcher, Grieger, and Mrs. McMullen.

"Chuckawalla Slim", the noted desert rat and guide, displayed a fossil collection of marine shells, teeth of the three toed horse, an agatized snail, and an Atascadero oyster fifteen inches long and weighing fifteen pounds.

Following the meeting, the traders got together and spent most of the night swapping specimens.

By WENDELL O. STEWART,
Director of Mineralogical Society.

Hollywood Nature Club

The recently organized Hollywood Nature Club announces that its first series of public lectures was a great success and that others are being planned for the fall and winter.

The purpose of the club is to interest residents of Hollywood and vicinity in the study of the natural sciences and the preservation of the natural resources, including wild life. It plans to carry on its work through the medium of lectures, classes, field trips, and the radio.

All local nature lovers are urged to send their names and addresses to the secretary, Miss Myfannwy Andrews, 2500 N. Beachwood Drive, Hollywood, Calif., so that they can receive notices of the meetings. W. Scott Lewis, mineralogist and well-known popular science lecturer is president of the club.

Los Angeles Mineralogical Society

This society, recently organized, has a membership of nearly one hundred enthusiastic collectors. Meetings are held on the third Thursday of every month and a cordial invitation is extended to every subscriber to ROCKS AND MINERALS, residing in or in the vicinity of Los Angeles, to attend the meetings. The officers are: Dr. Thomas Clements, of U. S. C., President; Mr. John Herman, Chemist and Scientist, Chairman of Memberships; Dr. Howard R. Hill, Los Angeles Museum, Treasurer; Mrs. Gertrude S. McMullen, Mineralogist and Gem Expert, 426 Metropolitan Bldg., Los Angeles, Calif., Secretary.

New York Academy of Sciences

At the meeting of the New York Academy of Sciences on May 1, Dr. Adolph Knopf, of Yale University, gave a discussion of the geology of the Spanish Peaks area of Colorado. He described the intrusives of the area, and the symmetrical arrangement of the dikes, and illustrated the talk by excellent lantern slides. The talk provoked much discussion and Dr. Knopf was asked many questions, particularly on the relation of the structure to the symmetrical development of the intrusives.

New York Mineralogical Club

The meeting of the New York Mineralogical Club on May 17 consisted of a symposium on calcite. Many unique specimens of calcite were displayed and described by the members of the club. Some of the members discussed the results they have been getting from various typs of ultra violet light sources. Notice was given of two field trips, one the usual Memorial Day field trip of the New York Club to the Bedford Quarries, the other a trip on June 11 to one of the old mines at Somerville, N. J., conducted by Dr. A. C. Hawkins.

The annual field trip of the club was held Tuesday, May 30th, at the Bedford Feldspar Quarries, Bedford, N. Y., with Mr. James G. Manchester in charge. The activities began around 10:00 A. M. and were centered chiefly in the upper part of Baylis Rose Quartz Quarry where a blast had been set off that very morning by Mr. Jeffress, superintendent of the quarries, for the express use of the collectors present. The blast was set off in that part of the quarry especially rich in columbite, autunite, tobernite and hyalite, and a large number of these minerals were collected. Unfortunately, it rained throughout the morning, at times quite steadily, but this did not dismay those present. Mr. Manchester was everywhere in evidence, assisting beginners in identifying their finds, answering questions, advising where good specimens could be found and even donating choice specimens from his collection which he had brought for that very purpose. It is Mr. Manchester's warm interest and cordiality in meeting friends and assisting beginners that explains the popularity of the Club's field trips.

Two new minerals are recorded from the Baylis Rose Quartz Quarry. Peristerite, which was first found by Dr. Laurence F. Rainsford of Rye, N. Y., some time prior to the trip and which was also found on the trip, occurs with smoky quartz. Molybdenite, as small masses on smoky quartz, was found by C. H. Klein, of Hudson, N. Y., on the trip.

At the height of the activities, 70 people were counted but it is believed at least 100 were present as many left when it began to rain steadily.

The Journal Club

On May 12, 1933, the Journal Club of the Department of Geology and Mineralogy of Columbia University held its 30th annual dinner at the Faculty Club of Columbia University. This year the dinner was held in conjunction with the ninth meeting of the New York State Geological Association. Dr. Douglas W. Johnson was toastmaster. Mr. Frederick S. Dellenbaugh described his trip through the Grand Canyon of the Colorado with the Powell Expedition sixty years ago. Mr. Gerard Wheeler gave a humoris skit explaining the troubles of a prospective candidate for the Ph. D. Professor R. J. Colony then gave a talk on the rocks in the New York area but the scientific features of the talk were overshadowed by his recital of a humorous poem dealing with a rock.

After singing the variation of "Auld Lang Syne" written by the late Professor Kemp, and familiar to all Columbia University geologists, the group adjourned to Schermerhorn Hall for an inspection of the collections and laboratories.

Dr. Balk's Field Trip

On Sunday, April 30th, Dr. Robert Balk, of Hunter College, conducted a field trip into the Clove Quadrangle. Twenty-eight geologists, mostly from Columbia University, were on the trip. The contact of quartzite and gneiss east of Dover Plains and north of Ellis Pond were examined in detail. The marble quarry at South Dover was visited, and a study made of the limestone near Bulls Bridge with its quartzite lenses. An investigation was made of the limestone-schist contact south of Webatuck, and the southward plunging folds of schist were examined. Dr. Balk explained in detail the field evidence in support of his correlation of the Manhattan-Inwood-Lowerre series as Cambro-Ordovician. This field trip excited much interest, as the correlation of the Manhattan-Inwood-Lowerre series still remains a bone of contention among geologists familiar with the problem.

Comment and Criticism

To The Editor of "R & M":

Several geologists have suggested that I send you a brief history of the Morefield Mine, located near Winterham, in Amelia County, Virginia, and below I will tell in my own words the history of this mine.

On an afternoon the latter part of September, 1929, I was squirrel hunting on our farm and accidentally ran across some mica lying on the ground, on a southern slope of a hill. I also noticed quartz rock, bits of greenish stone and some kind of a stone with six smooth sides. Not knowing anything about minerals, all I noticed at the time was the color of the stones. Well, I began to wonder what I would find down in the ground, and a few days later I took my equipment that I used for blasting stumps and went over on the hillside. After looking over the ground, I selected a spot and managed to get a hole down about four feet. Then I put two sticks of dynamite in and set off a blast. After the smoke had cleared away, I walked up and began investigating, and the first thing that I noticed was mica, large blocks that were twelve inches across, a six sided greenish stone about twelve inches long, also some other green stone. I brought a sample of each back to the service station, which I was operating at that time in Amelia. The next day a car drove up and two men got out, telling me to fill the car with gas and they walked on in the service station. They had noticed my samples of the stones and wanted to know where I got them from. They told me the names of each stone and said that they were from the U. S. Bureau of Standards, Washington, D. C. After a long talk, they decided to spend the night in Amelia and go with me to the mine the next morning. That was my first lesson in mineralogy. These men explained to me that I had discovered a pegmatite dike, extending over 500 yds., tracing the outcrop. They then told me the history of the Rutherford Mine that had been so famous for rare minerals for many years, and said that I had about the same formation.

I became more interested, and kept on working from time to time finding different minerals and collecting specimens. I soon met the Virginia State Chemist, Mr. Jones, and his Assistant, Mr. Elder, who would lose no time in identifying all the different minerals I carried into their office.

Up to this writing, I have found more than 34 different minerals and a few we are not sure of. Those identified are:

Albite	Clear Quartz
Amazonite	Smoky Quartz
Apatite	White Beryl
Beryl	Golden Beryl
Biotite	Orthoclase
Columbite	Euclase
Garnet	Zircon
Hornblende	Labradorite
Microlite	Phlogopite
Microcline	Agate
Monazite	Spessartite
Muscovite	Andradite
Phenacite	Rutile
Tantalite	Ilmenite
Topaz	Kaolin
Tourmaline	Chrysoberyl
Galena	Helvite

I have been more and more interested in minerals, and am constantly on the lookout for crystals. I have found clear quartz crystals, smoky quartz crystals, both large and small, also, small clear quartz crystals formed in large white Beryl. Phenacite, both clear crystals and massive formation, was found among Amazonite and also among Beryl. The massive formation was first classified by Dr. C. S. Ross, U. S. Geological Survey, and clear Phenacite crystals by Dr. R. J. Holden, Professor of Geology, V. P. I., Blacksburg, Va. I will say right here that I am very thankful to Dr. Ross, Dr. Holden, Dr. Wm. F. Foshag and the Virginia State Division of Chemistry. Without their interest and cooperation I would never have determined the different minerals found on our place.

I have sold many specimens of Phenacite, Beryl, Columbite crystals that weigh from 1 to 3 pounds, also Microlite in gangue and out, a large quantity of gem quality Amazonite, several tons of Beryl for the BeO content, several carloads of crude Feldspar, some mica crystals, and also sheet and scrap mica.

If subscribers to ROCKS AND MINERALS wish to visit the mine, they are welcome, and I will do my best to make their visit interesting. I can easily be located at Amelia Court House, Virginia, as we are the only Morefields in this County.

Very truly yours,

S. V. MOREFIELD,
Amelia Court House, Va.

To the Editor of "R & M":—

The story by Mr. Brown in the June issue of ROCKS AND MINERALS, of the Scout Mineral Club, especially interested me inasmuch as the scout troop with which I am associated has been collecting rocks and minerals for several years. This troop —Troop 205 of Easthampton, Mass.—in the last four years has accumulated a collection of four hundred or more specimens representing about two hundred varieties. The main part of the collection is on permanent exhibition in a cabinet in the meeting hall of the sponsoring institution, "The Improved Order of Red Men", whose membership point to it with pride to visiting delegates. A lesser part, but probably the most important, is located in the children's department of the Public Library, and consists of purely local specimens of rocks and minerals from the adjacent Mt. Tom Range and the valley sandstone and shale. Notable among the range minerals are fine specimens of babingtonite and large datolite crystals. In the sandstone and shale the outstanding specimens are fossil fish, water ripples and dinosaur footprints. All the specimens are properly labelled according to location, age, and scientific name. In 1931 the collection won blue ribbons in the youth's department exhibits at the Eastern States Exposition in Springfield, Mass., and at the Three County Fair at Northampton, Mass.

Last November, a young scout noticed that on some slabs of a recently laid flagstone walk were several track-like impressions in relief. He notified the scoutmaster who recognized the markings as tracks of a small dinosaur. The owner of the walk generously donated the slabs which contained the footprints. Sometime later the slabs were taken to Amherst College where Dr. Loomis and Dr. Bain viewed them and declared the impressions to be the tracks of a hitherto unknown specie. Especially interesting are three or four tracks with thin toes about one inch long with a circular pad-like ending instead of the usual claw. Amherst College has since worked the ledges from which the slabs came and two large slabs containing about forty tracks each are now on exhibition in the college museum. No more of the tracks with the circular termination were found however. Recently the troop presented a representative group of dinosaur tracks to Mt. Holyoke College for Women at South Hadley, Mass., in return for which Miss Talbot, head of the department of geology and geography, presented the troop with a collection of minerals from distant localities.

No regular club, such as described by Mr. Brown, has been organized within the troop or district. It is the custom for scoutmasters on the occasion of field trips to take along boys who show intelligent interest or boys who merit an outing for work done with the troop. Experience on these trips has demonstrated that the keen eyes, eager physical energy and natural inquisitiveness of the boys are responsible for the finding of the best specimens. Incidentally the scoutmaster of the troop has made a special hobby of collecting dinosaur footprints of which he has approximately a hundred or more ranging in size from one half inch to seventeen inches in length, representing many different kinds. The officers and members of the troop would welcome the opportunity to be of assistance to any member of the Rocks and Minerals Association when in this locality.

JOHN E. KITSON,
30 Briggs St.,
Easthampton, Mass.
June 27, 1933.